University of Alberta

An exploratory study of school leaders' thinking and problem solving through protocol analysis

by

Angeliki Lazaridou ©

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment
of the requirements for the degree of Doctor of Philosophy

in

Educational Administration and Leadership

Department of Educational Policy Studies

Edmonton, Alberta

Fall 2002

National Library
of Canada

Acquisitions and
Bibliographic Services

395 Wellington Street
Ottawa ON K1A 0N4
Canada

Bibliothèque nationale
du Canada

Acquisitions et
services bibliographiques

395, rue Wellington
Ottawa ON K1A 0N4
Canada

Your file Votre référence

Our file Notre référence

The author has granted a non-exclusive licence allowing the National Library of Canada to reproduce, loan, distribute or sell copies of this thesis in microform, paper or electronic formats.

L'auteur a accordé une licence non exclusive permettant à la Bibliothèque nationale du Canada de reproduire, prêter, distribuer ou vendre des copies de cette thèse sous la forme de microfiche/film, de reproduction sur papier ou sur format électronique.

The author retains ownership of the copyright in this thesis. Neither the thesis nor substantial extracts from it may be printed or otherwise reproduced without the author's permission.

L'auteur conserve la propriété du droit d'auteur qui protège cette thèse. Ni la thèse ni des extraits substantiels de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation.

0-612-81217-0

Canada

University of Alberta

Library Release Form

Name of Author:	Angeliki Lazaridou
Title of Thesis	An exploratory study of school leaders' thinking and problem solving through protocol analysis
Degree	Doctor of Philosophy
Year the Degree Granted	2002

Permission is hereby granted to the University of Alberta Library to reproduce single copies of this thesis and to lend or sell such copies for private, scholarly, or scientific research purposes only.

The author reserves all other publication and other rights in association with the copyright in the thesis and, except as herein before provided, neither the thesis nor any substantial proportion thereof may be printed or otherwise reproduced in any material form whatever without the author's prior written permission.

A Lazaridou

28 Octovriou St. 36 Kato Pefki
Athens, Greece, 151 21

Date: June 3, 2002

University of Alberta

Faculty of Graduate Studies and Research

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled *An exploratory study of school leaders' thinking and problem solving through protocol analysis* submitted by Angeliki Lazaridou in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Educational Administration and Leadership.

Dr. J. Fris, Supervisor

Dr. M. Doherty, Committee member

Dr. K. Ward, Committee member

Carolin Kreber

Dr. C. Kreber, Committee member

Tara Fenwick

Dr. T. Fenwick, Committee member

G.D. Taylor

Dr. G. Taylor, Chair

Dr. D. Allison, External Examiner

Date 22 May 2002

ABSTRACT

Leadership has traditionally been seen as an interpersonal phenomenon relaying heavily on the interactions between leaders and followers. In this work, leadership is presented as a complex social phenomenon depending fundamentally upon the leaders' abilities and skills to solve the kind of complex problems that organizations currently face. Based on that premise, this study was designed to investigate the problem solving processes and strategies, types of knowledge, values, and leadership styles that ten school principals used while working on a set of five cases that included two types of organizational problems: strategic and human relations. The findings describe principals' skills in constructing, planning, executing, and regulating their solving activity. They also provide insights into the types of knowledge and the values the principals accessed during problem solving as well as their preferred leadership style. Furthermore, it was found that, with the exception of problem-solving processes, the principals emphasized different problem-solving strategies, types of knowledge, and values while solving strategic as opposed to human relations problems. The data indicated also that linear models of problem solving have limited utility in understanding leaders' behaviors in complex social organizations; chaos and complexity theories may be useful supplements. The implications of these findings for the theory and practice of leadership are also considered.

In loving memory of Dr. W. H. O. Schmidt

1913-2001

This is the true joy in life, being used for a purpose recognized by yourself as a mighty one, being a true force of Nature instead of a feverish little clod of ailments and grievances complaining that the world will not devote itself to making you happy. I want to be thoroughly used up when I die. For the harder I work, the more I live. I rejoice in life for its own sake. Life is no brief candle to me. It's a sort of splendid torch, which I've got to hold up for the moment and I want to make it burn as brightly as possible before I handing it on to future generations.

George Bernard Shaw

ACKNOWLEDGEMENTS

I would like to acknowledge the following people:

My parents for their unconditional love and support throughout this journey of learning and experience.

My supervisor and mentor, Dr. J. Fris, for teaching me the values of faith, trust, and forgiveness.

My extended thesis committee: Dr. Maryanne Doherty, Dr. Kenneth Ward, Dr. Carolin Kreber, Dr. T. Fenwick, Dr. Gerald Taylor, and Dr. Derek Allison. Thank you for your time and dedication in helping me bring this work to completion.

My friends in Canada, the United States, and Greece, for their continual encouragement, faith, and support.

To you all, I'm eternally grateful.

LIST OF TABLES

Table **Page**

1. Synthesized problem-solving processes 41
2. Principals' demographic information 56
3. Frequencies and percentages of problem-solving processes 68
4. Problem-solving strategies across problems and participants 79
5. Types of knowledge: frequencies and percentages across participants 85
6. Clusters of knowledge: frequencies and percentages across participants 86
7. Percentages of values across participants 94
8. Problem-solving processes across problems 103
9. Problem-solving strategies across problems 104
10. Percentages of types of knowledge across problems 105
11. Percentages of values across problems 106
12. Mean scores of the transformational leadership dimensions 108
13. Mean scores of the transactional leadership dimensions 108
14. Mean scores of leadership effectiveness scales 109

LIST OF FIGURES

Figure **Page**

1. Integrated framework....38
2. Strategy: conversion....81
3. Strategy: decomposition....82
4. Strategy: reversion....83
5. Strategy: solution oriented....84

TABLE OF CONTENTS

CHAPTER I INTRODUCTION TO THE STUDY 1

Problem solving and effective leadership 2

A promising focus for research 3

Problem statement 4

Questions investigated 4

Defining terms 5

Organization of the study 6

CHAPTER II BACKGROUND RESEARCH AND THEORY 7

Evolution of thinking about leadership 8
- Focus on traits 8
- Focus on leaders' behaviors 9
- Focus on situations/contexts 10

Contemporary foci in theory and research 12

Focus on leaders' cognitions 18
- Problem-solving theory 19
- Problem-solving theory in social settings 27
- Some theoretical and research issues 35

An integrated framework 37
- Problem-solving processes and strategies 39
- Knowledge 42
- Values 42
- Leadership styles 43

Judgement 44

Need to test the model **45**

Conclusion **45**

CHAPTER III DESIGN OF THE STUDY **49**

Paradigms **49**
Fundamental paradigmatic issues 49
My paradigmatic profile 50

Objectives and questions addressed **53**

Research method **54**
Participants 55
Materials 56
Data Collection 59
Data Analysis 60

Ensuring credibility **61**
Validity and reliability of the research measures 61

Limitations **65**

Delimitations **65**

Ethical considerations **66**

CHAPTER IV RESULTS **67**

PROBLEM-SOLVING PROCESSES 67

PROBLEM-SOLVING STRATEGIES 78

TYPES OF KNOWLEDGE 85

VALUES 93

Judgement 101

TYPES OF PROBLEMS 102

LEADERSHIP STYLES 107

CHAPTER V DISCUSSION, IMPLICATIONS, AND CONCLUSIONS 112

Discussion 112

Implications 129

Conclusions 133

REFERENCES 135

APPENDICES 143

CHAPTER I

INTRODUCTION TO THE STUDY

Leadership has been the object of extensive study, especially since the beginning of the last century. A major imperative has been the belief that good leadership is critical in achieving organizational effectiveness (e.g., Kerr & Jermier, 1978, 1996; Mumford, Zaccaro, Harding, Jacobs, & Fleishman, 2000; Slater, 1995, as cited in Hoy & Miskel, 1996). Notwithstanding the sustained efforts to understand leadership, relatively little progress seems to have been made. For example, in the 1990 handbook of educational administration, Bass (as cited in Bennis, 1959) reported that more than 3,000 empirical studies had been conducted, but "probably more has been written and less is known about leadership than any other topic in the behavioral sciences" (p. 259).

This early assessment still holds true amongst leadership researchers and theoreticians. For example, Hanson (1996) indicated that in the mountain of literature on leadership, "there is less than meets the eye," and "most of the results are contradictory and inconclusive" (p. 153). Notwithstanding (or probably because of) this, the intense scrutiny of leadership continues. As a result, the large body of literature that deals with leadership continues to grow and has many foci.

Hence the later literature contains characterizations of leadership that differ according to the ends pursued and the means used. Accordingly, leadership styles such as instructional, visionary, facilitative, transformational, and transactional are among the most popular descriptions of leadership. Among these recent concepts, one stands out because it reflects another trend in leadership research and theory: transformational leadership. Conceptualisations of this type reflect a recent tendency to focus on the *aesthetic* nature of leadership (e.g., Hodgkinson, 1991; Sergiovanni, 1991).

This focus on aesthetics, according to ancient Greek philosophers, consists of the pursuit of truth, plenty, the good, beauty, and fun. The pursuit of truth is the societal function of science. The pursuit of plenty is a function of organizations that are concerned with producing and distributing the resources that make possible the pursuit of ends. The pursuit of the good involves ethical and moral principles. The pursuit of beauty and fun are considered necessary aspects of aesthetics because they make possible the continuous pursuit of ideals. A transformational leader is one who understands the nature of an organization and who facilitates the formulation of an inspiring vision, encourages the pursuit of that vision by displaying courage and moral character, and makes that pursuit satisfying for all stakeholders. Seen this way, leadership is primarily an aesthetic function.

During the 1980s and 1990s, the field of educational administration was marked by the emergence of yet another trend: the nature of the cognitive and professional knowledge base (Hart, 1999). This trend represents a major shift in educational leadership. Perspectives that dominated the field up to this point drew heavily from the social and behavioral sciences (Campbell, Fleming, Bennion, & Newell, 1987). In contrast, this more recent trend focuses on the way leaders think, what they think about, and the ways in which they tie their thinking with their actions (Hart, 1999). This focus was more deeply grounded in cognitive psychology than in behavioral psychology, and it has influenced both the cognitive and the professional knowledge base since then.

Enthusiasts of the cognitive perspective on educational leadership assert that it combines "wise practice, reflection, and context as critical elements in revising mainstream assumptions" (Cuban, 1993, p. 19). By focusing on leaders' intentions, knowledge, and beliefs, cognitive perspectives seek insight into the why, when, and where leaders act as they do and how they think about it along the way (Hart, 1999). By applying the cognitive framework in educational leadership, scholars address the core intellectual functions of leaders, such as problem finding and problem solving, which are seen as central to decision-making of educational leaders (Hallinger, Leithwood, & Murphy, 1993).

PROBLEM SOLVING AND EFFECTIVE LEADERSHIP

Before Haller and Strike's (1986) work, the moral nature of administrative problems in the fluid context of social interactions had rarely been considered directly. Until then, problem solving had been investigated primarily in highly controlled laboratory settings and within theories of decision-making. Although such theories contributed to the understanding of how administrators make decisions, they failed to provide insights into how administrators interpret and think through the problems that give rise to decisions. Inquiring into how administrators perceive, interpret, understand, and solve organizational problems is now seen to be very important in extending understandings of leadership and improving educational administration.

A PROMISING FOCUS FOR RESEARCH

As Leithwood (1995, p. 115) stated, cognitive perspectives make three contributions to the study of educational administration: (a) They redefine the meaning of effective leadership by focusing attention on the internal, cognitive processes of leaders; (b) they change our understanding of the knowledge base required to exercise effective leadership; and (c) they enrich our understanding of how leadership expertise develops. In domains other than education it has been shown that leadership expertise is associated with both effective and efficient problem solving. Experts solve problems quickly, with few errors, and have superior short- and long-term memories for information in their domain (Ericsson & Charness, 1994; Reimann & Chi, 1989; Van Lehn, 1989). Educational leaders, too, are expected to have expertise of this kind. However, until recently, researchers have not paid much attention to exploring this form of expertise and how it develops among school administrators, who must solve organizational problems in contexts that have fluid structures and dynamics.

One exception has been the work of Leithwood and his associates, who have conducted research in an effort to illuminate the cognitive processes that give rise to particular leadership styles (Leithwood & Jantzi, 1989, 1992, 1995). The bulk of their research has focused on the identification of a problem-solving model that represents the cognitive processes of school leaders as they work to solve organizational problems. In the course of reviewing the available information, there are two parallels outside the educational domain: studies by Voss, Greene, Post, and Penner (1983) in the field of social science; and, more recently, the work of Mumford et al. (2000) in military business.

The study by Voss et al. (1983) focused on the problem-solving processes of experts and novices while solving a political science problem. This team's contribution to the existing literature was the development of a problem-solving model that included the cognitive processes of the solvers and described how these processes may be organized into "strategies" or general approaches to problem solving.

Mumford et al. (2000) described a multifaceted model of factors that influence effective leadership, focusing on particular leadership characteristics and capabilities. Specifically, this model suggests that leaders' complex problem-solving skills, social-judgement skills, and knowledge directly influence the quality of their problem solving and subsequent performance. Mumford also proposed that leaders' skills and knowledge are conditioned by other attributes including general cognitive abilities and personality.

PROBLEM STATEMENT

The present study draws on these works and is driven by two general inadequacies in present understandings about problem solving by school principals. First, there is a lack of research in education about the problem solving of school principals—with the exception of Leithwood's work— which justifies the exploratory nature of the present study. Second, although the studies by Leithwood in the education sphere, by Voss in the broader social science domain, and by Mumford in the military context have produced empirically grounded models of problem solving, I believe that these models alone cannot provide adequate answers as to how leaders, in particular educational leaders, think and solve organizational problems. Rather, an integrated framework that incorporates these three models would seem to provide a more comprehensive picture of the problem solving of school administrators. The study reported here was designed to explore this hypothesis with a small number of school principals.

QUESTIONS INVESTIGATED

At the heart of this study was an examination of the problem-solving skills (processes and strategies) used by *a selected group of reputationally effective* school principals when they work on solving organizational problems. The general objective is captured in the following questions:

1. *What problem-solving processes do principals use to solve problems?*
2. *What problem-solving strategies do principals use to solve problems?*
3. *What types of knowledge do principals use while problem solving?*
4. *What values do principals use while problem solving?*
5. *What evidence of judgement is there in principals' problem solving?*
6. *Do principals use different problem-solving processes, strategies, types of knowledge, and values when solving different types of problems?*
7. *What characteristics of transformational and/or transactional leadership are evident in principals' problem solving?*

DEFINING TERMS

The following definitions of terms were used to guide the study:

Problem-solving processes: the cognitive processes of principals while they work through a problem.

Problem-solving strategies: A strategy is "a sequence of activities characterised both by its component processes and by the organisation of these processes into a coherent whole" (Kail & Bisanz, 1982, p. 230).

Knowledge: organized representations of facts and principles that apply to objects and events in problem domains (Chi, Glaser, & Rees, 1982).

Human relations problems: situations that deal with relations between peers, superiors, and subordinates, and with psychological and social factors.

Strategic problems: situations that relate to the organization's goals, purposes, and objectives as well as significant influences on the organization as a whole.

Transformational leadership: Transformational leaders emphasise

> *stimulating interest among followers and colleagues to view their work from new perspectives, generating awareness of the mission or vision of the team and organization, [with the aim of] developing colleagues and followers to higher levels of ability and potential, and motivating colleagues and followers to look*

> *beyond their own interests toward those that will benefit the group. (Bass & Avolio, 1993, p. 43)*

ORGANIZATION OF THE STUDY

The remainder of this dissertation is comprised of four chapters:

Chapter II	I review the pertinent literature in three stages. First I review the evolution of thinking about leadership in general and, more specifically, in the educational context. Next I review the contemporary foci in leadership theory and research focusing on leaders' cognition. In the third part I summarize and synthesize the theory from these two bodies of literature and discuss the framework that guides the study.
Chapter III	I outline the design of the study.
Chapters IV	I present the findings of the study in relation to the research questions.
Chapter V	I compare my findings against the information presented in the relevant literature, and my conclusions concerning the ramifications for theory, practice, and further research.

CHAPTER II

BACKGROUND RESEARCH AND THEORY

The importance of leadership in terms of being able to shape and give direction to social organizations has never been disputed. Hemphill (1949), an early advocate, made this clear when he stated, "Both laymen and scientists agree that if we can understand the selection and training of leaders, we can begin to take adaptive steps towards controlling our own social fate" (p. 3). The study of leadership is distinctly a practical endeavour. We study leadership with the hope to improve training, identify alternative selection and assessment procedures for assessing leaders' capabilities, and increase our understanding of how leaders' decisions shape the behaviour of organizations or society as a whole (O'Connor, Mumford, Clifton, Gessner, & Connelly, 1995).

A great deal has been learned about leadership over the past century, but there is much more to be learned in the years to come about the different forms that leadership can take as well as the effects of these forms on organizations. The leadership literature is replete with theories, each of which has unique value for understanding aspects of leadership. As one considers the nature of contemporary approaches evident in the leadership literature, it is important to take a look back at some of the evolving concepts of leadership that have helped to shape our current thinking.

In the following sections, the evolution of thinking about leadership is outlined. The general purpose is to identify the components of the conceptual landscape of leadership that have been explored and to establish where new "expeditions" seem to be needed. For this purpose, I begin with a brief overview of the evolution of thinking about leadership from the earliest theories to the contemporary approaches, particularly those with an emphasis on leaders' cognitions. Next, I present a review of the most representative research about leaders' cognition to date, outlining areas for future exploration. Last, I present a synthesis of the literature, outlining a framework and a rationale for undertaking the present study. Given the qualitative aspect of the study, however, I'm aware that further literature and theory might have to be introduced when discussing the findings.

EVOLUTION OF THINKING ABOUT LEADERSHIP

FOCUS ON TRAITS

In the beginning of the 20th century it was believed that leaders possessed unique physical and psychological characteristics that predisposed them to be effective in positions of influence. Hence, early research focused on identifying those traits or characteristics that differentiated leaders from followers (Gibb, 1959; Stogdill, 1948, as cited in Hoy & Miskel, 1996). The most frequently studied traits included the following:

- *Physical characteristics*, such as weight, height, and intelligence.
- *Personality factors*, such as self-confidence, stress confidence, emotional maturity, and integrity.
- *Motivational traits*, such as strong task and interpersonal needs, power, and achievement values, and high expectations.
- *Skill traits*, such as technical, interpersonal, conceptual, and administrative skills (Fiedler, 1967, as cited in Hoy & Miskel, 1996; Schmidt & Hunter, 1992; Stogdill, 1948, as cited in Hoy & Miskel, 1996).

Although a number of personality, motivational, and skill factors were found to differentiate leaders from nonleaders, by themselves, they were not sufficient to explain the complexity of leadership. Recently, researchers have re-analyzed the body of research on traits using advanced statistical techniques (Yukl, 1994). The updated analyses suggest that personal characteristics do influence the perceptions of leadership. These findings imply that traits may enhance the *perception* that someone may be a better leader than others, but traits are not predictive of leadership effectiveness. In other words, the notion that personal characteristics guarantee leadership effectiveness has not been supported satisfactorily. This realization led researchers to shift the focus from individual attributes to behaviours. Such examples are the studies that were carried out by the Ohio State University team, the University of Michigan, and Blake and Mouton.

FOCUS ON LEADERS' BEHAVIORS

THE OHIO STATE LEADERSHIP STUDIES

The Ohio State Leadership Studies Group carried out a number of studies in the early 1950s on the effects of leadership behaviour on group performance. This group of researchers is best known for developing the Leader Behavior Description Questionnaire (LBDQ; Hemphill & Winer, 1973; as cited in Hoy & Miskel, 1996), and the two-factor theory of leadership as defined by the concepts of "consideration" and "initiating structure." Factor analysis of the LBDQ data indicated that it measured two kinds of leadership behaviour: *consideration* and *initiating structure*. Consideration was defined as the degree to which a leader acts in a warm, supportive way and shows concern for subordinates. Initiating structure was defined as the degree to which a leader "organizes and defines relationships or roles, and establishes well-defined patterns of organization, channels of communication, and ways of getting things done" (Bowers & Seashore, 1973; as cited in Hoy & Miskel, 1996, p. 442).

THE MICHIGAN STUDIES

At the University of Michigan, studies were conducted in the 1950s under the direction of Rensis Likert and the Institute of Social Research. By comparing the behaviours of ineffective and effective managers, this group of researchers showed that effective managers had a task orientation that focused on planning, coordinating, and facilitating work without interfering with good interpersonal relations. Effective managers were more likely to treat subordinates considerately and to allow some degree of autonomy in deciding how to conduct their work. They also set high performance goals for subordinates and used group methods of supervision (Ubben, Hughes, & Norris, 2001). Another interesting finding from this group of studies was that high morale (defined as the total satisfaction a worker gets from a work situation) did not result in high productivity. Notwithstanding, the managerial practices that resulted in high productivity did tend to result in high morale (Likert, 1953; as cited in Ubben et al., 2001).

BLAKE AND MOUTON

Blake and Mouton's work (1964; as cited in Hoy and Miskel, 1996) is related conceptually to the Ohio State Leadership studies and the Michigan studies. Their concept of leadership resulted in the development of the *managerial grid*. The grid is based on two dimensions: *concern for people* and *concern for production*. Concern for people is similar to the earlier concept of consideration, and concern for production is similar to the concept of initiating structure. The basic hypothesis in Blake and Mouton's work is that the most effective leaders are high on both production and people concerns. The concept is useful for analyzing the managerial weaknesses that might prevent the best job from being done. Once a managerial deficiency is identified, training programs that are skill focused can be developed and delivered to address the problematic behaviour.

FOCUS ON SITUATIONS/CONTEXTS

Even though the Ohio State (1957) and Michigan (1967) studies shed light on effective leadership behaviours, they failed to take into account the differences in situations that demanded leadership, as well as the expectations and behaviours of subordinates and superordinates. Over the past three decades, a strong trend in leadership theory has been towards a situational approach. The work of Fiedler, and Hersey and Blanchard, and House's path-goal theory marked the beginning of that era.

FIEDLER'S CONTINGENCY THEORY

Fiedler's (1973; as cited in Hoy & Miskel, 1996) theory postulates, "the performance of interacting groups is contingent upon the interaction of leadership style and situational favourableness" (p. 468). Fiedler argued that group effectiveness is a feature of leader attributes and situational factors. He also claimed that task-oriented leaders perform well in both favourable and unfavourable situations, whereas people-oriented leaders do better in situations of intermediate favourableness. Fiedler argued that situations vary in terms of the degree to which they lend themselves to being controlled by the leader. In high- and low-control situations, leaders would do best to focus on the task, whereas in situations that fall in between these two extremes, they would do better to focus on human relations.

Whether or not a situation is classified as high or low control depends on three things: the position power of the leader, the relationship between the leader and followers, and the structure of the task (Ubben et al., 2001). When the leader's position power is strong, the task is structured, relations are good, and control is high. Low position power, poor relations, and unstructured tasks make for a low-control situation. Although some have criticized Fiedler's methods and conclusions, a major contribution of his work has been his questioning of the belief that there is one best way to lead. Fiedler was among the first to introduce the situational perspective in leadership. However, his theory does not say much about how leaders can manage a work group successfully. Hersey and Blanchard (1982; as cited in Hoy & Miskel, 1996) examined this aspect of leadership.

HERSEY AND BLANCHARD'S SITUATIONAL LEADERSHIP THEORY

Hersey and Blanchard (1982; as cited in Hoy & Miskel, 1996) identified four distinct leadership styles: *telling, selling, participating, and delegating*. Each is viewed as an appropriate style depending on the situation. The key variable in the situation is what Hersey and Blanchard called the "maturity" of the group. Mature groups respond best to delegation; immature groups respond to a high degree of direction (telling). Hersey and Blanchard's hypothesis was that as group members become more experienced and committed to the tasks that confront them, better productivity will be attained through greater sharing of decision-making. This model is consistent with other theories that suggest that power sharing through delegation should result in greater productivity in groups that have demonstrated mature attitudes and advanced skills. This study, however, does not have an adequate research base (Ubben et al., 2001). To compensate for the missing research base, House (1971; as cited in Hoy & Miskel, 1996) developed the path-goal theory of leadership.

PATH-GOAL THEORY OF LEADERSHIP

In 1971 House (as cited in Hoy & Miskel, 1996) wrote:

> *The motivational function of the leader consists of increasing personal payoffs to subordinates for work-goal attainment, and making the path to those payoffs easier to travel by clarifying it, reducing roadblocks and pitfalls, and increasing the opportunities for personal satisfaction en route. (p. 324)*

According to House, the effect of leader behaviour on satisfaction and motivation depends on the situation. Characteristics of subordinates, such as ability and personality, and characteristics of the organizational environment, such as type of task and importance of the work, are the key determinants (Ubben et al., 2001).

House (1971; as cited in Hoy & Miskel, 1996) identified four categories of leadership behaviour:

- *Supportive leadership*, which includes considering the needs of subordinates, showing concern for their welfare, and creating a friendly climate in the work.
- *Directive leadership,* which lets subordinates know what is expected from them, identifies guidelines, rules, and procedures and monitors the work.
- *Participative leadership,* which takes subordinates' opinions and suggestions into account.
- *Achievement-oriented leadership*, which sets challenging goals, seeks performance improvements, emphasizes excellence in performance, and shows confidence that high standards will be attained.

Behavioural and situational theories are important moves beyond traits theories in that they view leadership as involving a *repertoire* of styles and behaviours, and they bring the issue of context to the forefront. These theories have influenced further research in the broader leadership domain, including school leadership. An account of this literature follows.

CONTEMPORARY FOCI IN THEORY AND RESEARCH

In regard to school leadership, Leithwood, Jantzi, and Steinbach (1999) reviewed the contemporary leadership literature and extracted six major approaches: transactional or managerial, instructional, transformational, participative, moral, and cognition-focused.

Leithwood and his colleagues claimed that, even though these approaches are not pure types, they stand out in the leadership literature. In the following sections, I describe these approaches with an emphasis on the points of the leadership landscape they have addressed.

TRANSACTIONAL/MANAGERIAL LEADERSHIP

This type of leadership is essentially oriented to establishing and maintaining control over functions, tasks, and behaviours. Its main assumption is that if these functions are carried out competently, the work of others in the organization will be facilitated (Leithwood et al., 1999). Managerial leadership is the equivalent of House's directive leadership, where authority and influence are embedded in formal positions, and clear expectations ensure efficiency and effectiveness.

The debate about the relationships between management and leadership has led to the consensus that the two concepts are complementary and should not be considered separately (Leithwood, 1992). There is now much evidence that effective administrators attend to both managerial and leadership tasks in their everyday lives. For example, Rossmiller (1992; as cited in Hoy and Miskel, 1996) identified two broad functions in which school leaders typically engage: buffering the technical core (curriculum and instruction) of the school from excessive distractions and interruptions, and smoothing "input or output transitions" (e.g., organizing support groups for students experiencing stress; p. 143). The cumulative evidence is that leaders need to adopt a "bifocal" perspective in exercising leadership, one that includes both managerial and nonmanagerial aspects of leading (Deal & Peterson, 1994).

INSTRUCTIONAL LEADERSHIP

This type of leadership focuses on teachers' behaviours that affect students' growth and influence a school's instructional culture (Leithwood et al., 1999). Although the original models of instructional leadership placed the school principal at the forefront of learning, there is still much interest in considering the dimensions of that leadership as guides to a more shared approach to leadership (Ubben et al., 2000).

Sergiovanni (1994) identified five leadership behaviours that a principal may use: technical, human, educational, symbolic, and cultural.

- *Technical* behaviours include being a good manager and applying good planning, organizing, coordinating, and controlling techniques to ensure school effectiveness.
- *Human* behaviours include human relation skills, implementing good motivational techniques, and building good morale within the organization.
- *Educational* behaviours focus on the knowledge of education. Such skills include the ability to diagnose educational problems, exercise adequate supervision, evaluate educational programs, help develop curriculum, implement staff-development activities, and develop individual programs for children.
- *Symbolic* behaviours include demonstrating to others things that the leader believes important for the organization. It involves "that continuous stream of actions by the organization's formal leadership which has the effect of inducing clarity, consensus, and commitment regarding the organization's basic purposes" (p. 7).
- *Cultural* behaviours focus on strengthening the values that make the school unique. The principal achieves this by sharing with others (students, staff, and parents) the values and traditions of the organization.

PARTICIPATIVE LEADERSHIP

First embraced by Yukl (1994), this form of leadership assumes that leaders should emphasize the decision-making processes of the group. This view is grounded in the notion that democracy is promoted through participative leadership. Participative leadership has been associated with organizational effectiveness. Participative leadership is also related to moral leadership insofar as authority and influence rest with legitimate stakeholders—whose legitimacy is based on their expert knowledge, their democratic right to choose, and/or their critical role in implementing decisions (Leithwood et al., 1999). Compared with House's (1971; as cited in Hoy & Miskel, 1996) participative leadership, moral leadership is more consultative, open, and democratic, allowing for more involvement in decision-making.

Over the past decade, participative leadership has taken different forms in school restructuring initiatives, including site-based management, local management of schools, or shared decision-making. Although the emphasis here is still primarily on practices or behaviours, this emphasis in leadership studies includes some consideration of followers' feelings, cognitions, values, and ideals.

TRANSFORMATIONAL AND TRANSACTIONAL LEADERSHIP

The next progression in theorizing about leadership is evident in Bass's (1985) theory of leadership, which builds on Burns' (1978) work. This theory includes the notions of transformational and transactional leadership and posits that most highly successful leaders have a profile of leadership that includes both transformational and transactional factors. The nature of transactional leadership was described above; the nature of transformational leadership is presented next.

The primary objective of transformational leadership is to develop "the commitments and capacities of organizational members" (Leithwood et al., 1999, p. 9). An important premise is that higher levels of personal commitment to organizational goals are associated with extra effort and greater productivity. Transformational leadership is directed at effecting transcendence of self-interest by both leaders and followers (Allix, 2000), and it has been associated with such leadership concepts as charismatic, visionary, cultural, empowering, and inspirational. This conceptualization of leadership focuses attention on both the behavioral and cognitive aspects of leadership and followership.

The two constructs, transformational and transactional leadership, have been operationalized in the Multifactor Leadership Questionnaire (MLQ; Bass & Avolio, 1995). The MLQ consists of two forms: a Leader Form and a Rater Form. The MLQ - Rater and Leader Form rate four transformational leadership dimensions: *idealized behaviours, inspirational motivation, intellectual stimulation, and individualized consideration*. Attributed to them is a fifth item called *idealized attributes*. Out of the 45 items on the MLQ, four items each measure the transformational leadership dimensions of inspirational motivation, intellectual stimulation, and individualized consideration. Eight items measure the dimension of idealized influence.

The MLQ - Rater and Leader Forms also measure three dimensions of transactional leadership: *contingent reward, management-by-exception active, and management-by-exception—passive.* Out of the 45 items on the questionnaire, four items each measure the three dimensions of transactional leadership. Another leadership dimension measured by the *MLQ* is *laissez-faire* leadership. Three other dimensions on the MLQ - Rater and Leader Forms measure leader 's effectiveness. According to Bass and Avolio (1998), high ratings in dimensions of effectiveness are an indicator that transformational and/or transactional leadership practices are being displayed. These dimensions include *effectiveness, extra effort, and satisfaction.* Two items in the MLQ measure satisfaction, three items measure extra effort, and four items measure effectiveness. Leaders completing the MLQ evaluate how frequently or to what degree they believe that they engage in the three leadership behaviours of transformational, transactional, and laissez-faire. Raters completing the MLQ evaluated how frequently or to what degree they have observed their leader engaging in behaviours associated with the three leadership dimensions (Bass & Avolio, 1998).

The notion of transformational leadership has had considerable impact in the educational context (Gronn, 1996; Leithwood et al., 1999). In a series of studies, Leithwood and his colleagues developed a model of transformational leadership for schools that consists of eight dimensions: building school vision, establishing school goals, providing intellectual stimulation, offering individualized support, modeling best practices and organizational values, demonstrating high performance expectations, creating a productive school culture, and developing structures for participation in school decisions. In this model, transformational leadership is characterized as leading to "higher levels of personal commitment to organizational goals and greater capacities for accomplishing those goals", which is "assumed to result in extra effort and greater productivity" (Leithwood et al., 1999, p. 9).

What distinguishes transformational leadership from the previous leadership types is its emphasis on the symbolic aspect of leadership, the importance of shared leadership, and the recognition that leadership behaviours are embedded within the organizational culture—constantly shaping and being shaped by it (Hoy & Miskel, 1996). One reason for transformational leadership receiving considerable attention in educational leadership research is its emphasis on moral principles and commitment to visions. Burns (1978) argued that morality and values are integral to leadership, stating that transactional leadership is driven by *modal values* such as honesty, responsibility, fairness, and honouring of commitment; whereas transformational leadership is concerned with such *end values* as liberty, justice, and equality. Through their values, leaders are able to motivate followers to work toward goals that transcend individual needs and align with organizational visions (Conger, 1999). With their emphasis on developing "the commitments and capacities of organizational members" (Leithwood et al., 1999, p. 9), transformational leaders add individual empowerment and organizational commitment or engagement to the leadership equation.

Because of its focus on envisioning, challenge, and inspiration for engaging in shared goals, transformational leadership reflects the gradual shift in leadership studies and theories to consideration of the affective and cognitive dimensions of human existence. Furthermore, the different priorities or emphases of transformational and transactional leaders may result in different behaviour patterns and may require different skills.

MORAL LEADERSHIP

Similar to transformational leadership, moral leadership emphasizes values. Those writing about moral leadership argued that values must be the focus of leadership practices (Evers & Lakomski, 1996; Sergiovanni, 1992). One of the proponents of this orientation, Hodgkinson (1991), claimed that "values constitute the essential problem of leadership; if there are no value conflicts, then there is no need for leadership" (p. 11). Moral leadership assumes that the focus should be on promoting ethics. In this way, authority derives from what is right or wrong (Leithwood et al., 1999). Values, as the central focus of this form of leadership, constitute the backbone of a democratic society and allow for the participation of all stakeholders. Schools, as public institutions, embody the same principles; they cannot be administered or governed effectively if constitutional rights and responsibilities are violated.

CONCLUSION

As shown in the preceding parts of this review, research on leadership initially focused almost exclusively on the identification of leadership *behaviours* that are effective, starting with the Ohio State University studies and progressing through the work of Blake and Mouton, Hersey and Blanchard, and Fiedler. More recently—for example, in the work of Bass and his associates—the "field of vision" in organizational and leadership studies has expanded to include the *aesthetic* nature of leadership—the pursuit of truth, plenty, the good, beauty, and fun. As I stated in Chapter I, the pursuit of truth is the societal function of science. The pursuit of plenty is concerned with producing and distributing the resources that make possible the pursuit of ends. The pursuit of the good involves the ethical and moral principles. The pursuit of beauty and fun makes possible the continuous pursuit of ideals.

Clearly, conceptualizations of leadership now recognize that leadership is a dynamic process that involves the complex interplay of the personal, organizational, and the broader social context (Christie, 1998). Much has been learned, and new territories for exploration have opened up. Among these is the domain of leaders' cognitions. Some research has been done, but further investigation is required. One area of study is how leaders make sense of their complex situations, how they think about their work, and how their actions are tied to their thinking. A review of research and theory along those lines of inquiry follows.

FOCUS ON LEADERS' COGNITIONS

Several researchers have argued that the focus of future research on organizational leadership ought to be more on the cognitive dimensions of leadership and less on leadership styles (Hart, 1999; Zaccaro, Mumford, Connelly, Marks, & Gilbert, 2000). Research on leaders' thinking has focused almost exclusively on how leaders solve organizational problems. Thus, for example, we find Mumford and his colleagues conducting a series of investigations to probe the ways in which leaders go about solving organizational problems (e.g., Connelly et al., 2000; Mumford et al., 2000). The results of these studies indicated that "successful leaders are capable of identifying and solving significant organizational problems using an analysis of organizational requirements and constraints, along with wisdom and perspective taking, to craft viable solutions likely to work within the organizational context" (Mumford & Van Doorn, 2001, p. 282). Mumford and colleagues advocated this perspective because they saw contemporary leaders as having to "balance the tendency toward stability (brought about by prior investments, interdependencies among systems, and people's habits) with the need for change to cope with shifts in the environment, technology, and available resources" (Mumford et al., 2000, p. 13)

By focusing on an individual's intentions, knowledge, beliefs, and actions, researchers using this approach addressed the core intellectual functions of leaders—problem finding and problem solving. Seen from this perspective, a leader's effectiveness is "a function of whether he or she can identify goals, construct viable goal paths, and direct others along these paths in a volatile, changing socio-technical environment" (Mumford et al., 2000, p. 13).

Clearly, from this perspective, understandings of leaders' cognitions (and to a lesser extent affects) are important. Research on leaders' thinking has focused mainly on how leaders solve organizational problems. Before reviewing this line of research, it is important to consider some of what is known about problem solving. Accordingly, in the following section, I present an overview of some elements of the problem-solving theory as well as a brief review of the problem-solving literature as it applies to educational as well as non-educational settings.

PROBLEM-SOLVING THEORY

Problem solving has long been recognized as an important cognitive activity in relation to theory and practice and, more generally, to the issues that confront people in daily living. A number of theoretical approaches have provided explanations of how problem solving takes place (Lesgold & Glaser, 1989). These include Gestalt theory, with its perceptual emphasis (Gestalt psychologists view the solution process as a restructuring of the solver's cognitive organization of the problem); learning theories—with a stimulus-response emphasis (e.g., Maltzman; as cited in Lesgold et al., 1989); theories of cognitive development—in which problem solving is used to monitor mental development (e.g., Piaget); and, more recently, information-processing theories—theories that consist of hypothetical structures and relationships that explain how information is received, stored, retrieved, and further used in solving problems (e.g., Frederiksen, 1984; Newell, Rosenblum, & Laird, 1990). In the following sections I will review the basic elements of the problem-solving process, the role of expertise, requisite skills, types of problems, and linear vs. nonlinear problem solving.

ELEMENTS OF PROBLEM SOLVING

Three elements of problem solving have received attention in the literature: *problem representation, problem-solving procedures,* and *pattern recognition.* These elements are closely interrelated for the experienced problem solver, and they determine how knowledge structures influence the solving of a problem (Frederiksen, 1984).

Problem representation

Task environment and problem space are the basic components of how one represents a problem. The task environment is "the structure of facts, concepts, and their interrelationships that make up the problem" (Frederiksen, 1990, p. 367). The problem space is "the solver's mental representation of the task environment" (p. 367). The task environment may differ from problem to problem. For some problems, such as a puzzle, it may be quite simple; for others, such as a personal conflict, it may be large and complicated.

The quality of the solution to a problem is determined by how well the problem has been represented. An incomplete or inaccurate problem representation may make it difficult or impossible to solve the problem (Frederiksen, 1990). Studies that compared how novices and experts solved physics problems have shown that novices tend to sort problems on the basis of surface features, whereas experts categorize them on the basis of the fundamental principles of physics (Chi, Feltovich, & Glaser, 1981; Chi et al., 1982).

Problem-solving procedures

Many procedures are used in problem solving. They range from algorithms for arithmetic computation to general strategies, heuristics—such as means-end analysis, plans, the hypothesize-and-test method, and the best-first search. Selection of an appropriate procedure for solving a problem depends on the nature of the problem. For example, means-end analysis is more likely to be used in problem situations in which the goal is clearly specified, whereas the hypothesize-and-test method may be particularly relevant for ill-structured problems (Frederiksen, 1990).

Pattern recognition

Pattern recognition is a very important component of problem solving in that it "greatly reduces processing load and serves the purpose of retrieval aid for desirable courses of action" (Chase & Chi, 1980, pp. 11-12). Pattern recognition, furthermore, is associated with expertise. Experts, with training and experience, learn to recognize patterns that they can use in processing further information (Glaser & Chi, 1988; Nickerson, 1988-89; Van Lehn, 1990).

EXPERTISE

The notion of expertise and how it develops has received increasing attention among scholars in various domains. Research has identified several features that are characteristic of experts:

- An expert within a specific domain has a large and well-organized knowledge base.
- This body of knowledge allows experts to classify problems according to principles, laws, or rules, rather than surface features.
- This knowledge base is highly organized, allowing experts to identify patterns and configurations quickly and accurately. This ability reduces cognitive load and permits the expert to attend to other variables within a problem.

- The problem-solving strategies of experts become procedures. Experts can automatically invoke these skills, whereas novices often struggle with the problem-solving process.
- Acquisition of this complex knowledge base takes a long time. Expertise within a domain is linked to years of practice, experience, or study (Ohde & Murphy, 1993).

SKILLS

The theory and research reviewed here point to the skills needed to solve problems. Such skills include being able to organize information into appropriate knowledge structures, being able to represent a problem appropriately, being able to process some information automatically, and using pattern recognition systems efficiently to trigger appropriate problem-solving procedures (Frederiksen, 1984). Such skills are developed primarily through practice, are specific to a relatively narrow area of expertise—such as algebra, physics, or mechanics—and apply mainly to a class of problems defined as well-structured as opposed to ill-structured.

WELL- VERSUS ILL-STRUCTURED PROBLEMS

Most of the research on problem solving has involved well-structured problems. Little theoretical or research attention has been paid in the field of educational administration to the solving of problems that are ill-structured, even though these problems are encountered frequently in everyday and organizational life.

Two examples of theorizing that incorporate the different types of problems are found in the work of Wagner and Sternberg (1985) and Funke (1991). Wagner and Sternberg (1985) described the differences between what they called *academic* problems and *practical* problems. Academic problems are well defined and are often those formulated by others. One may not know the answer to a particular academic problem, but one is rarely in doubt about what the problem is. Academic problems come with all the information required for solution; they typically have one correct answer, or one or a few methods for obtaining the correct answer. In contrast, practical problems tend to be ill structured. Practical problems are characterized by a number of possible solutions, none of which may be completely correct, and each of which is associated with liabilities and assets. Also, practical problems typically require searching for additional information. Finally, practical problems carry two additional difficulties: determining how much additional information is required to solve the problem and how best to obtain and incorporate the information into the process of solving the problem.

More recently, Funke (1991) defined ill-structured problems as having the following features:

- *Intransparency*—only knowledge about the symptoms is available, only some variables lend themselves to direct observation, and/or the large number of variables involved requires selection by the problem solver of a few relevant ones.
- *Polytely*—multiple goals may be present that could interfere with each other.
- *Situational complexity*—there are complex connectivity patterns among variables.
- *Time-delayed effects*—not every action shows immediate consequences.

RATIONAL VS. NONLINEAR PROBLEM SOLVING

One of the consequences of recognizing two types of problems is the possibility that there are distinct problem-solving approaches for each type. Indeed, in the field of administration/management there are those who view managers as rational technicians and those who view them as "crafters" (Wagner, 1991). What is known about the differences between the two approaches is outlined next.

Rational perspectives on problem solving

Taylor (1947) was an early proponent of the rational approach to problem solving. Taylor argued that management can be explained in terms of a set of scientific principles. Kepner and Tregoe (as cited in Wagner, 1991) identified four principles that apply in this approach to problem solving:

1. Problems are the result of some change that has caused an unwanted deviation from expectations. In order for a problem to occur, a change must have occurred.

2. Problems are defined as deviations from expected standards of performance. The problem is defined by the difference between expected and actual performance.
3. Problems are identified by comparing actual performance to an expected standard of performance. Managers should always be searching for possible problems by comparing what is happening to what is supposed to be happening.
4. A complete and precise description of the problem is attained in two stages. The first step is to address what is happening, to what extent, when it is happening, and where. The second step is to compare situations in which the problem is found to similar situations in which the problem is not found. For example, a problem may occur in one work team but not in another comparable work team.

Rational approaches to problem solving have a number of strengths. First, they are explicit; thus they are easy to communicate and be inculcated with training. Second, they are general. They can be applied regardless of the context; hence they become widely applicable. This means that managers can move from one assignment to another, relying on general solutions as opposed to context-dependent or situation-specific solutions. Third, these approaches are based on sound principles of logic and scientific reasoning.

However, despite these strengths, studies have shown that managers rarely use the rational approach when solving problems. For example, rather than employing a step-by-step approach that ranges from problem definition to solution, managers routinely proceed without a clear understanding of the nature of the problem (Mintzberg, 1973; Mintzberg, Raisinghani, & Theoret, 1976). Furthermore, studies of experts' performance have cast doubt on the power of general, context-free approaches to problem solving. As a result, researchers have asked whether there are alternative or complementary approaches to rational problem solving.

The non-linear aspect of problem solving

Isenberg (1986) used a variety of methods to study how experienced administrators solve problems. His studies showed that leaders took action well before all the facts were known, that they made more inferences from the data and asked for less additional information, and that they used personal experience to formulate solutions to problems.

Isenberg also observed that managers worked simultaneously on a number of problems that were in various stages of completion, they were aware of the need to act under conditions of ambiguity and inadequate information, and they relied on intuition. These characteristics point to the nonlinearity of the problem-solving process.

In similar fashion, Mintzberg et al. (1976) observed that problem solving rarely proceeds along the lines specified by the rational model of problem recognition, analysis, solution generation, and implementation. Rather, it is often a recursive operation that involves numerous reconceptualizations. Several researchers have noted that [the problem-solving] process is not linear. Instead it involves a re-evaluation of the product of earlier steps in problem solving as a function of the products and conclusions of later steps. (Zaccaro et al., 2000)

Further research has confirmed Mintzberg et al.'s (1976) observations about the nonlinear nature of some problem solving (McCall & Kaplan, 1985; Mumford et al., 2000). Research in this area, furthermore, suggested that nonlinear problem solving is elicited by certain organizational needs. Modern organizations are characterized by complexity, conflict, and dynamism; and many individuals and groups have an opportunity to become involved in the problem-solving process. Thus, leaders are confronted not with simple, isolated problems, but with dynamic situations involving many complex, interwoven problems. Because problems are complex and interconnected, and because environments are dynamic, rational and analytical methods do not suffice. In an attempt to make sense of this complexity, researchers have turned their attention to, amongst other things, the nature of organizational problems.

TYPES OF PROBLEMS

A group of researchers (Mumford & Connelly, 1991; Marshall-Mies et al., 1996; Zaccaro, Gilbert, Thor, & Mumford, 1991) has described typical organizational problems as featuring four characteristics:

- Organizational problems emerge within dynamic and typically complex environments.

- The ambiguity of organizational environments suggests that, typically, organizational problems will be ill structured.
- Because organizational environments constantly change, the parameters of problems are also changing.
- Solutions to these problems need to be generated and implemented within a complex organizational context in which various conditions and organizational constituencies will restrain the types of solutions that are workable.

Studies by Cowan (1991) and Kilmann (1989), conducted in the business domain, have identified four types or categories of organizational problems:

- *Human relations problems:* These include situations that deal both with relations between peers, superiors, and subordinates, and with psychological and social factors.
- *Technical problems:* These include situations that deal with the application of technology and with organizational structures and procedural protocols.
- *Strategic problems:* They are those that relate to the organization's goals, purposes, and objectives as well as significant influences on the organization as a whole.
- *Operational problems:* These relate to specifying courses of action for the immediate future as well as achieving organizational goals and objectives.

These researchers also concluded that strategic and human relations problems are by their nature ill structured, whereas technical and operating problems are well structured. For example, strategic problems deal with "ambiguous issues of broad scope" (Thompson & Strickland, 1984; as cited in Cowan, 1991) and with "far-reaching consequences" (Moorehead & Griffin, 1989; as cited in Cowan, 1991). Further, because human relations problems typically are rooted in people's values and feelings, often they are not immediately apparent. Thus, in dealing with this kind of problems, managers may have to rely more on inferences and intuition. Findings from the educational literature confirm the difficulties associated with managing human problems. For example, Leithwood and Steinbach, (1995) and Allison and Allison (1993) have reported that school principals identify people-related problems as the most difficult to deal with because they involve emotions and conflict.

In another series of studies, Cowan (1988, 1991) found that noneducational leaders normally distinguish between strategic and operational problems and between technical and human relations problems. Further, they seem to use different processes to solve problems in each of these categories. In the domain of educational administration, Allison (1996) has pointed out that leaders tend to deal less with managerial problems and more with problems that focus on values and human relations. Allison also noted that little attention has been devoted to the cognitive aspect of leaders' approaches to technical, operational, or strategic problems.

PROBLEM-SOLVING THEORY IN SOCIAL SETTINGS

Problem-solving theory has influenced research in both educational and noneducational settings. However, the bulk of this research has been conducted in the context of subjects such as physics and geometry and in scientific experiments. Relatively little attention has been paid to problems of everyday life. The very first instance of the latter was a study by Voss et al. (1983). Other investigations of this type have been conducted by Leithwood and by Mumford. Accounts of their work follow.

THE RESEARCH OF VOSS, GREENE, POST, AND PENNER

Voss et al. (1983) identified a number of reasons for studying social science problem solving. One was to examine whether theoretical developments in problem solving could be applied in the social science domain. A second reason was that problems in social settings were more likely to be ill structured, and research of these kinds of problems was sparse. Finally, social science problems cover a wide range of domains, from economy and politics to education; thus "a better understanding of problem solving in such domains may help to improve instruction in these areas" (p. 166).

Two features that distinguish Voss et al.'s (1983) study are its focus on ill-structured problems and the development of a comprehensive set of cognitive processes and strategies that describe the problem-solving activity. The problem posed to Voss et al.'s subjects was that of increasing crop productivity in the Soviet Union. They identified two structures in problem solving: a *control structure* and a *reasoning structure*, each with its own set of operators.

The control structure relates to goal attainment and controls the problem-solving process. This structure includes seven processes:

1. *State constraint*: articulating constraints, implicitly or explicitly.
2. *State sub problem*: identifying a particular factor as a subproblem.
3. *State solution*: proposing a solution to a given problem or a subproblem.
4. *Interpret problem statement*: considering how the problem is to be understood and/or represented.
5. *Provide support*: generating an argument to support the existence of a subproblem or a constraint.
6. *Evaluate*: stating an argument that supports or rejects a solution or evaluates a solution in relation to a constraint.
7. *Summarize*: using evidence that supports the existence of a problem or a constraint.

The reasoning structure is complementary to the control structure and includes the justifications that subjects use during problem solving. Voss et al. (1983) found that social science problem solving includes argument development, which involves "building a case for a proposed solution" (p. 171).

The reasoning structure includes 10 processes:

1. *State argument*: providing a statement in support of a previous comment.
2. *State assertion*: referring to a constraint, subproblem, or solution as part of an argument development.
3. *State fact*: supporting a statement using a fact.
4. *Present specific case or example*: stating a specific case or example, which demonstrates the contents of a previous statement.
5. *State reason* to a previous statement.

6. *State outcome* of a previous statement.
7. *Compare and/or contrast* previous statement.
8. *Elaborate and/or clarify*: elaborating or clarifying a previous statement.
9. *State conclusion:* providing a conclusion after a series of previous statements.
10. *State qualification:* using a statement to restrict the applicability of a previous statement.

Voss et al. (1983) went beyond simply identifying the elements of the problem-solving processes used by experts; they also described how these processes are organized into *strategies* that help solvers address the problem. A problem-solving strategy is a *set* of cognitive processes. Voss found three archetypal combinations of processes (strategies) on which experts tended to rely most heavily:

- *Decomposition,* in which the main problem is broken down into a set of subproblems, usually no more than three.
- *Conversion,* in which the given problem is converted into another issue for which a solution may be offered.
- *Identifying and eliminating* the factors that contribute to the problem.

Unfortunately, Voss et al. did not indicate which processes were involved in these strategies. This needs to be investigated with further research.

One difference between experts and novices that emerged from Voss et al.'s (1983) study relates to the time taken to develop problem representations, with experts spending more time doing so. Another insight from this study is that in the *stating solution* process, experts generated fewer but more abstract solutions and spent considerable time in developing arguments related to their solutions. Novices, on the other hand, proposed more and simpler solutions with very little argument development. Another important contribution of this study is the finding that experts, more than novices, "build a case for why the proposed solution would work" (p. 274). In other words, in addition to devising a plan based on their own criteria, the participants recognized that any proposed solution would have to be accepted by fellow members of the relevant community. Voss et al.'s study is a landmark in social science investigations of problem solving and has prompted further studies of this nature in other areas of social science.

LEITHWOOD'S RESEARCH

In the domain of educational leadership, Leithwood and his associates (1989, 1991, 1993, 1994) pioneered investigations to describe educational leaders' problem-solving processes. Their research offered the first comprehensive set of results concerning the nature of school leaders' problem solving and its relationship to leadership practices. In Leithwood and Stager's (1989) early inquiry into how 22 elementary principals thought their way through ill-defined problems, a set of five grounded categories of problem-solving processes emerged. In subsequent work these categories were refined into what may be termed Leithwood's six-factor model of problem-solving processes. As described in later publications (Allison, 1996; Leithwood & Steinbach, 1995; Leithwood, Steinbach, & Raun, 1993), this model consists of six components that are grouped under three general categories:

- Understanding
    - Interpreting problem
    - Setting goals
- Solving
    - Identifying constraints
    - Generating solutions
- Disposition
    - Considering values
    - Considering mood

Allison (1996) did much to inform the discussion that follows.

According to Leithwood and his colleagues, the "understanding" processes of *interpreting* and *setting goals* contribute to the construction of a "problem space" that comprises the leader's understanding of the problem and the purposes that he/she seeks to achieve. In the "solving" category, the *constraints* component is concerned primarily with identifying obstacles that influence the solving process. To *generate solutions*, the leader makes use of knowledge derived from "a deliberate search through memory for relevant procedural schemata" (Leithwood & Steinbach, 1995, p. 126). In the "dispositions" category, the *values* component was conceptualized initially in terms of the longer-term goals that had to be satisfied in dealing with the problem situation; however, following further investigations, it came to represent the process of factoring in salient human and organizational values. Finally, the *mood* component represents the process of factoring in feelings, emotions, and the leader's sense of self-efficacy in problem solving.

Using this model, Leithwood and Steinbach (1995) showed empirically that

- Expert principals used broader perspectives than did nonexpert principals when interpreting problems—particularly with regard to consequences for the school. In terms of problem difficulty, expert principals recognized the complexity and difficulties associated with less structured problems but generally regarded them as being manageable and soluble, whereas nonexperts were less confident as to how to proceed.
- Both experts and nonexperts attempted to solve less structured problems by relying on past experience, collecting additional information, and/or making assumptions. The experts, however, were more explicit about the assumptions they made.
- Both groups were found to be using anecdotes when interpreting the problems, but the anecdotes used by experts were more directly relevant to the problem at hand, suggesting that the experts had a richer store of accessible memories and that they were able to access these memories more accurately.
- Overall, expert principals appeared more confident when working on difficult problems and more in control of their emotions. Expert administrators also showed more respect and courtesy toward others (p. 130).

Subsequent studies of how senior school administrators responded to a variety of more or less structured problems (Leithwood & Steinbach, 1991, 1995), and how reputationally effective chief educational officers worked with their staffs (Leithwood et al., 1993) have largely supported the problem-solving processes demonstrated by expert principals. Much like school principals, senior administrators in these studies sought to develop a clearer understanding of the problems before solving them, and "they were able to relate presented problems to the broader organizational mission, and their current problem portfolio" (Allison, 1996, p. 535).

The findings from the Leithwood studies also provided insights into the importance of cognitive processes and abilities in the development of leadership expertise. Specifically, the six experts in the early studies had an average of 15 years of domain experience, whereas the more typical leaders had an average of 17 years of administrative experience. Thus, although all of the principals had acquired domain experience, the six designated experts appeared to have developed richer and more representative schemata that helped them to interpret and respond to problems.

In sum, Leithwood's work, as part of a broader cognition-focused approach to educational administration, showed that the way principals respond to organizational problems varies according to their level of expertise and the type of problem. Leithwood's line of research is a landmark in introducing the cognition-focused approach to educational leadership. His focus on how educational leaders solve organizational problems is paralleled in a number of studies in educational and noneducational organizations wherein researchers sought to better understand leadership. Among the most recent is a series of studies by Mumford et al. (2000). Their theory of leaders' problem solving is explained next.

THE RESEARCH OF MUMFORD AND COLLEAGUES

Mumford et al. (2000) have described organizational leadership as a form of skilled performance that is grounded in leaders' ability to solve complex and ill-defined organizational problems (Mumford et al., 2000; Zaccaro et al., 2000). Their investigations have focused on the skills, knowledge, and social judgements that seem to be related to leaders' effectiveness in solving organizational problem. Their data indicated that problem-solving skills and knowledge are the most potent in predicting effective leadership (Mumford et al., 2000).

Skills

In regard to the problem-solving skills, Mumford and Connelly (1991) identified seven skills that they grouped under two general categories:

- *Generation skills.* These comprise problem construction, information encoding, category specification, and category combination and reorganization.
- *Implementation skills*. These consist of idea evaluation, solution implementation, and solution monitoring.

The specific skills were defined as follows.

- *Problem construction* is defined as the solver's ability to understand and identify the situation, relevant goals, constraints, and outcomes (Zaccaro et al., 2000).
- *Information encoding* refers to the kind of information the solver needs before deciding how to solve the problem.
- *Category specification* is defined as the selection of the most crucial information among the available ones to solve the problem.
- *Category combination and reorganization* refers to how the various kinds of information are related to each other in order to formulate a plan of action.
- *Idea evaluation* refers to the solver's ability to decide among the various plans of action the best for the problem at hand.
- *Solution implementation* refers to defining the specific steps and strategies necessary to implement a particular solution.
- *Solution monitoring* refers to monitoring the availability and appropriateness of each solution relative to other solution candidates (Marshall-Mies et al., 2000).

Knowledge

Well before Mumford's (2000) investigations, researchers had concluded that the quality/extensiveness of leaders' knowledge is related to effectiveness in problem solving. Knowledge refers to organized representations of facts and principles that apply to objects and events in problem domains (Chi et al., 1982). The research had shown that leaders use knowledge representations to identify key elements of a problem, identify key information sources, generate and evaluate potential solutions, and identify key restrictions and constraints that must be considered when implementing solutions.

In Mumford et al.'s (2000) model, knowledge includes awareness of the characteristics of the *people*, the *organization*, and the *task*. According to this model, viable solutions to leadership problems are those that work within the particular context of the organization, which includes the people with whom one is working—their needs, desires, values, and capabilities (Mumford et al., 2000).

Social judgement

Mumford and his colleagues equated social judgement with social intelligence. It is designated a key leadership competency, particularly under complex and uncertain social conditions. But beyond this, there is little more in articles by Mumford and his colleagues to clarify the exact nature of "social judgement," except to note that judgement is related to the following characteristics in the problem solver:

- *An awareness of the problem solver's personal strengths and weaknesses.*
- *A willingness to learn from mistakes.*
- *A capacity to work with conflicting social demands.*
- *An awareness of the needs, goals, and demands of other social constituencies.*
- *An awareness of whether a proposed solution is consistent with existing social dynamics (Connelly et al., 2000).*

From scattered statements in various reports by Mumford and his colleagues, I am led to speculate—very tentatively—that these characteristics may be indicative of flexibility, openness to synergy, empathy, and appreciation of harmony. Further, the authors' occasional use of the term *wisdom* suggests that this ephemeral factor in decision-making may be the phenomenon that is often referred to as "discretion." But these thoughts are highly inferential at this point, based on only the vaguest of indications in the Mumford publications. In a series of studies that Mumford and his colleagues conducted to test their skills-based model, it was found that

- The skills and the knowledge specified in the model can be measured in organizational leaders.
- Problem-solving skills and knowledge were found to be highly effective predictors of performance.
- Leadership skills increase as a function of expertise. More specifically, it was found that training with assignments that present complex, novel, ill-structured problems contributed to the acquisition of these skills.
- Development of these skills is contingent on a complex set of abilities, motives, and personality characteristics. More important, it was found that certain patterns of personal abilities, motives, and personality characteristics, together with higher skill and knowledge levels, are positively related to leader performance (Mumford et al., 2000).

In conclusion, let it be noted that Mumford's research contributed to the trend to investigate leaders' performance by factoring in both interpersonal interactions and leaders' cognitions.

SOME THEORETICAL AND RESEARCH ISSUES

The studies by Voss et al. (1983), Leithwood (1989), and Mumford (2000) have resulted in significant advances in understanding the role of cognition in effective leadership. However, no one set of studies can examine all the factors involved in the complex social phenomenon of leadership. As with any other theoretical effort, this body of research leaves a number of issues unresolved. In the following section I examine such issues in each of the three theories, and I suggest how these three models can be integrated to provide a more comprehensive framework for explaining leaders' problem solving.

Voss et al.'s (1983) study is a landmark in social science investigations of problem solving and has prompted further studies of this nature. As noted previously, two features that distinguish this study are its focus on ill-structured problems and the identification of a comprehensive set of cognitive processes and strategies that describe problem-solving activities. Voss's study also described the differences between expert and novice problem solvers. However, one issue that remains unresolved is whether other kinds of leaders, such as leaders in educational organizations, use similar processes and strategies when solving complex problems.

In this regard, Leithwood's research provided partial answers by showing how educational leaders solved educational problems. Like Voss, Leithwood showed that experts solve problems differently than do nonexperts. And, also like Voss, Leithwood identified the cognitive processes used by educational leaders when solving organizational problems. Leithwood, however, did not investigate the cognitive *strategies* that educational leaders used to solve these problems. In cognitive psychology research strategies are considered essential to investigate "how complex cognitive tasks are performed, and how simple operations are combined into more complex sequences of activity" (Kail & Bisanz, 1982, p. 229). On the other hand, however, Leithwood and his colleagues did point to the importance of values and affects in problem solving by leaders—a component that was not present in Voss et al.'s study.

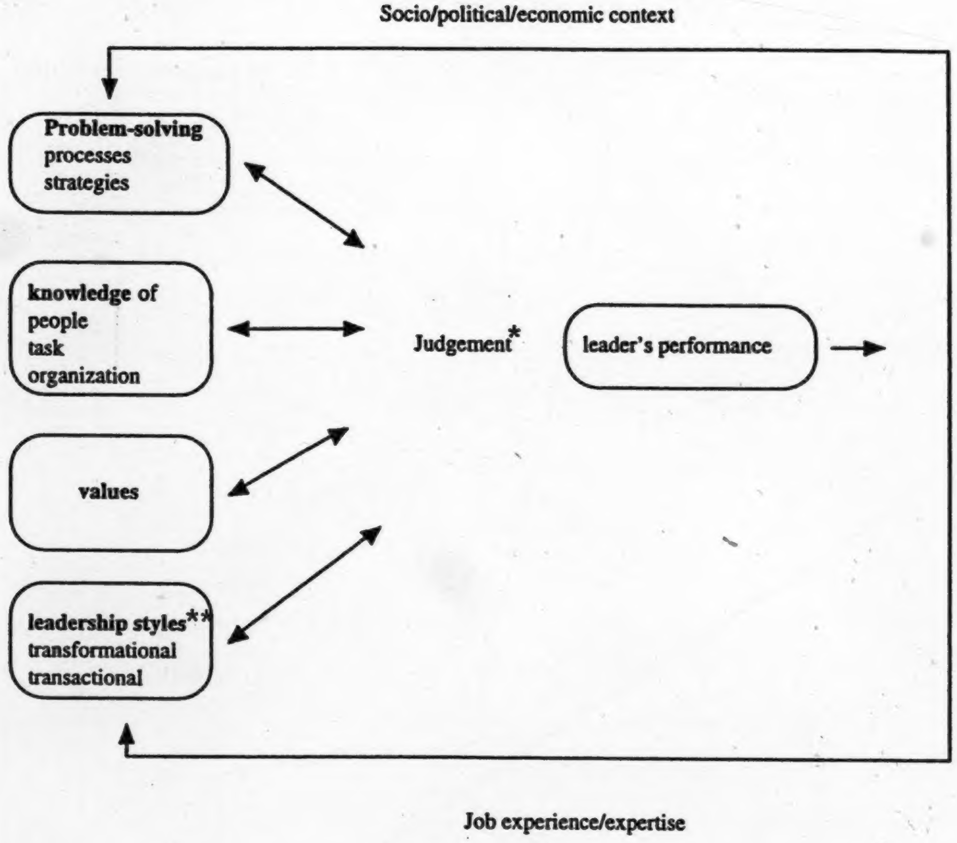
The importance of values was also alluded to in the research by Mumford and his colleagues. As Mumford, Gessner, Connelly, O'Connor, and Clifton (1993) pointed out, when leaders are presented with complex, ill-structured problems, personal values can and will influence the way they construct a problem, its implications for the organizational system as a whole, and others' reactions. But, although Mumford and his colleagues extended and refined previous cognition-focused theories of leadership, they did not examine the role of values in leaders' performance. Nonetheless, the focus in Mumford et al.'s work on judgement and knowledge structures, in addition to general problem-solving skills, provided a new perspective for understanding leadership. But, because Mumford et al.'s research was conducted in a military context, an issue that is of interest here is whether his skills-based model is useful in educational organizations as well.

A final issue, this time in the behavioural rather than cognitive domain, relates to Bass's (1985, 1990) theory of transformational leadership. Bass was concerned with identifying behaviours that typify exceptional leader performance. His *Behavioral Description Inventory* led to the identification of four factors associated with transformational leadership behaviours: *idealized influence, inspirational motivation, intellectual* *stimulation,* and *individualized consideration.* One question that arises is whether the kinds of cognitive skills used in problem solving, and their associated knowledge structures, align with any of these factors (p. 12).

AN INTEGRATED FRAMEWORK

Figure 1 presents a model that incorporates constructs from the models of problem solving that were developed by Voss et al. (1983), Leithwood (1989), and Mumford (2000). This synthesized model builds on the strongest points of the three problem-solving models and takes into account their shortcomings in an effort to produce more clarity and parsimony. A justification for bringing the three models together is the criterion of coherence (Evers & Lakomski, 1994). These authors maintained that the most useful theories are those that invite webbing with other theories to form a comprehensive, ever-increasing knowledge base.

Figure 1. Integrated Framework


Socio/political/economic context
Problem-solving
processes
strategies
knowledge of
people
task
organization
values
leadership styles**
transformational
transactional
Judgement*
leader's performance
Job experience/expertise

* The nature of judgement is uncertain (see page 44), as are its relationships with the other constructs in this model.

** The relationships between leadership style and the other constructs in this model were not investigated.

Thus, according to the coherence principle, the integration of theories is warranted if "it contributes to the generation of a general theory of administration that produces additional consistency, comprehensiveness, fecundity, and explanatory unity" (Evers, 1994, p. 6).

The integrated model recognizes, first of all, that problem solving takes place in a larger social context that includes the sociopolitical and economic factors as well as personal factors, such as job experience. Second, the model posits that four components—namely, *problem-solving skills*, *knowledge structures*, *values,* and *leadership styles*—influence the thinking and problem-solving capabilities of leaders. And these, in turn, influence leaders' performance within the broader sociopolitical and economic context in which this takes place.

Third, because of the ambiguity surrounding the concept of judgement, and after having carefully reviewed Mumford's use of this concept, it became apparent that judgement may serve as a lens through which leaders' problem-solving skills, knowledge, values, and leadership styles are filtered, rather than a social skill as described in Mumford's work. Fourth, these components are shown to be in *dynamic relationships* with one another. This contrasts with previous theories of problem solving that assumed a linear process. This model assumes that dynamic relationships among all four components are key determinants of effective leadership performance.

The importance of dynamic interaction among the components has recently been supported in the leadership literature. Wheatley (1999), for example, has argued that leadership is best understood when viewed through a relational and changing-systems lens. According to Wheatley, systems influence individuals, and individuals call forth systems; such a relationship evokes reality-in-flux. Thus, leadership is seen as a complex, dynamic phenomenon that is deeply embedded within ever-changing and complex systems.

PROBLEM-SOLVING PROCESSES AND STRATEGIES

In the integrated model, problem solving is comprised of *processes* and *strategies* that allow leaders to define (represent) the problem and formulate a solution framework or a set of ideas that might be useful for understanding the problem and developing initial solution strategies. Problem representations derived from past experience and knowledge of one's job have been shown to shape the way leaders represent the current problem, the kinds of information they look for, and the type of concepts they apply to the problem.

PROBLEM-SOLVING PROCESSES

The processes included in the integrated framework were derived from Voss's (1981) and Leithwood's (1990) models. The Mumford et al. (2000) work did not contribute to the specific problem-solving processes that are in the model; Mumford et al. did not identify specific processes but did present a five-fold classification: understanding the problem, gathering information, formulating a plan, implementing the plan, and evaluating the plan. The specific processes were described earlier in this review of the literature and are synthesized in Table 1. The synthesized model consists of 20 problem-solving processes.

PROBLEM-SOLVING STRATEGIES

The identification of problem-solving strategies has been of a special interest to researchers in the area of cognitive psychology. Despite this interest, researchers have not agreed on an exact definition of a strategy. Furthermore, research has shown that when different investigators use the term *strategy*, different connotations emerge (Kail & Bisanz, 1982). In this study, a strategy is defined as "a set of cognitive procedures characterised both by its component processes and by the organization of these processes into a coherent whole" (p. 230). Because Voss is the only one in the area of social science problem solving to having researched problem-solving strategies, the three strategies he identified (decomposition, conversion, and identifying and eliminating the factors that contribute to the problem) will be used in the integrated framework.

Table 1

Synthesized Problem-Solving Processes

Voss's model	Leithwood's model	Synthesized model
State constraint	Identifying constraints	Stating constraints
State subproblem		Stating subproblem
State solution	Generating solutions	Stating solutions
Interpret problem statement	Interpreting problem	Interpreting problem
Provide support		Providing support
	Setting goals	Setting goals
	Considering values	Considering values
	Considering mood	Considering mood
Evaluate		Evaluating
Summarize		Summarizing
State argument		Stating argument
State assertion		Stating assertion
State fact		Stating fact
Present specific case or example		Presenting specific case or example
State reason		Stating reason
State outcome		Stating outcome
Compare and/or contrast		Comparing and/or contrasting
Elaborate and/or clarify		Elaborating and/or clarifying
State conclusion		Stating conclusion
State qualification		Stating qualification

KNOWLEDGE

Because the result of leaders' problem-solving activity must be implemented and applied in a social context, certain forms of knowledge are necessary. Geiwitz (1993; as cited in Mumford et al., 2000), for example, has argued that knowing and monitoring social dynamics within the problem domain represents a key leadership skill. Leaders must not only be able to formulate a plan that works within the context of the organization, but they must also be able to implement this plan within a distinct social context—and may involve communicating a vision, guiding subordinates, and motivating others. This model differentiates three kinds of knowledge: knowledge of people, the tasks at hand, and the organization.

VALUES

More than ever before, educational leaders have acknowledged the impact of values on educational practices. As organizations become more complex and diverse, leaders become increasingly more sensitive to value issues. Leaders recognise, for instance, that the values manifested by individuals, groups, and organizations have an impact on what happens in schools, in that they are used by individuals to screen information or identify acceptable alternatives (Begley, 1996). More reflective leaders are also more conscious of how their values may influence the assessment of situations.

Kluckhohn and Strodtbeck (1961) defined a value as "a conception, explicit or implicit, distinctive of an individual or characteristic of a group, of a desirable which influences the selection from available modes, means, and ends of action." Conceptualizing values in this manner brings to the front the critical function of values in decision-making and problem solving. The significance of values in the study of leadership has been emphasized by Hodgkinson (1991), Begley, (1996), Evers and Lakomski (1996), and Leithwood and Jantzi (1991), to name a few. For example, Begley argued that the nature and function of values in leadership merit study for the following reasons:

- Leadership studies have overemphasized the technical and rational aspects of leadership and have neglected the nonrational moral aspect of it.

- Organizations have become increasingly more complex and challenging, and leaders find themselves working in environments with value conflicts.
- Working in such complexity, leaders must understand and reflect on their motivations, biases, and actions. They must become aware of the possible existence of their core values that may be incompatible with organizational or broader societal values.
- Leaders can be more effective when they understand or are able to interpret the actions of others. In particular, they need to understand and be able to reason on the actions of other constituencies.
- Finally, it is useful for leaders to be able to distinguish between personal, professional, organizational, and social values and to be able to know which values are appropriate to each situation (Begley, 1996).

LEADERSHIP STYLES

Earlier in this chapter, I presented a brief account of the evolution of leadership theories, showing the transition from the "traditional" ones, such as path-goal theory, to the more recent ones, such as transformational and transactional. Unlike the "traditional" theories, which emphasized rational processes, theories of transformational leadership emphasize emotions and values. The new theories also acknowledge the importance of symbolic behaviour and the role of the leader in making events meaningful for followers (Boas, 1999). These theories help us understand how leaders can influence followers to make self-sacrifices, commit to difficult objectives, and achieve more than was initially expected. Transformational leadership is differentiated from transactional leadership, which involves an exchange process to motivate follower compliance with leader requests and organizational rules.

The version of transformational leadership that has been used widely in studies was formulated by Bass (1990). Bass's version of transformational leadership is used in this study. There is considerable evidence that transformational leadership is effective as described in more details previously. Given the reported evidence about the significance of this type of leadership for organizations, I chose to include it in the framework for my study. However, I want to emphasize that this element received limited attention. I set only two objectives: to describe whether the participants displayed transformational and/or transactional styles of leadership as measured by the Multifactor Leadership Questionnaire (MLQ) and to show whether there was evidence of that in their think-aloud protocols. I did not explore the relationships between this construct and the other elements in the model.

JUDGEMENT

As noted earlier, Mumford identified "social judgement" as a significant element in leaders' problem-solving effectiveness. This construct, however, seems to have been difficult to define, for the definitions in the reports by Mumford and his colleagues are not entirely clear, and attempts by email to get clarification from the authors were fruitless. One difficulty is that "social judgement," as Mumford and colleagues defined it, includes elements that seem to belong in the "knowledge" domain. For example, Zaccaro et al. (1991) suggested, "Social judgement [includes] awareness of the problem solver's personal strengths and weaknesses, . . . an awareness of the needs, goals, and demands of other social constituencies, . . . an awareness of whether a proposed solution is consistent with existing social dynamics" (p. 18).

Because the term *awareness* equates with *knowledge* (OED: informed, cognizant, conscious, sensible. To be aware [of, that]: to have cognizance, **to know**), elements such as those identified in this quotation have been moved out of the judgement domain in the integrated framework.

Another difficulty is that the synonyms used—wisdom, perspective taking ("capacity to move beyond the problem to see other ways in which solutions can be useful"), and experience—are ambiguous, perhaps even contradictory. As the authors themselves acknowledged, "Stronger evidence bearing on the nature and significance of [such terms as wisdom] is desirable" (p. 25). To deal with the ambiguity of the term *social judgment*, I have chosen to use *judgement* and to define it as follows (borrowing heavily from *The Oxford English Dictionary*, 2002):

Judgement is the exercise of discretion—acting according to one's judgement or as one thinks fit; acting on one's sense of fitness, mere good, pleasure, or choice; as one thinks fits, chooses, or pleases.

1. Judgement, being a cognitive activity, has to be inferred from observed or reported behaviours, and/or from declarations or self-reports (as in think-aloud narratives).
2. Judgement is seen as a precursor of a leader's flexibility, creativity, divergent thinking, even occasional perversity and unpredictability.

NEED TO TEST THE MODEL

This integrated framework is untested; hence it is used as a conceptual framework for the present study. However, some limits have been imposed on this venture. First, although the model acknowledges that many variables—including career experiences and environmental influences—may influence leaders' thinking and performance, not all were considered in the present study. Indeed, I examined only the problem-solving processes and strategies, knowledge, and values that school principals referred to while problem solving. Second, because little attention has been given to how school leaders respond to different kinds of problems, I used the model to investigate whether different types of problems elicit different usage of problem-solving skills, knowledge, and values. If this should be the case, another question to be investigated is whether unique approaches to problem solving are associated with different types of problems as presented in the literature; namely, strategic and human relations problems.

CONCLUSION

Around the world, organizations and the societies of which they are a part are undergoing profound changes. Fundamental forms of societal systems are under challenge and changing as they adapt rapidly to a world of high technology, flexible workforces, downsized administrations, and declining resources. These complex changes pose real challenges to the theoretical and practical foundations of leadership. The call for effective leadership is, perhaps, more urgent now than at any other time in human history. Without effective leadership little positive change will happen. This is now certainly the case in education. As Leithwood (1995) claimed, if good learning depends on good teachers, good teaching ultimately depends on excellent leaders. The question "What constitutes effective leadership?" remains important.

Without question, the leadership literature is rich in theories and approaches to describing effective leadership. From the early attempts to identify the traits of exceptional leaders, through the situational approaches, to the recent concept of transformational leadership, what seems to constitute good leadership continues to evolve. New insights are constantly evolving and becoming part of the leadership menu that has evolved over the past century. There is no doubt that the store of leadership theories will continue to expand as we strive to lead in continuously changing societies more efficiently and effectively.

The review of literature presented in the preceding sections includes the primary theories that have appeared in the leadership arena and that have shaped our understanding of leadership to the present. Personality traits, behavioral styles, and situational characteristics have played a significant role in identifying leadership qualities associated with effective leadership. These enduring understandings have traveled through time and across organizational contexts, have been modified, extended, and enriched to fit the varied contexts in which leadership is exercised. Thus, for example, instructional leadership generally applies only in educational contexts, whereas concepts such as transformational, participative, managerial, and moral leadership have found expression in educational as well as in other organizational contexts.

What we have learned from these past investigations is that leadership is far more complex than was initially thought. It involves more than identifying a set of personality features, mastering a set of skills, finding the right situation, exhibiting a certain style, or combining these factors in a contingency approach (Hoy & Miskel, 1996). Leadership is first and foremost a social phenomenon, and we have a limited understanding of the factors that temper it, because there are many interacting factors and "we do not know what cause may yield what outcome" (Evers & Lakomski, 1996). Social life is complex and in constant flux; so are organizations, and so is leadership.

Environmental change and the diversity of human beings result in organizational contexts defined by complexity, conflict, and dynamism. To survive, organizations must control conflict, adjust to change, and choose the best path to goal attainment (Mumford et al., 2000). Accordingly, organizational leaders who are responsible for maintaining the viability of organizations must be able to solve organizational problems effectively and make decisions that will maintain social organization and ensure its effectiveness. Leaders must not only be able to define organizational mission and motivate followers to meet the mission requirements, but they must also be able to resolve issues that impede progress towards the accomplishment of organizational tasks; they must be able to select and implement action plans that will make possible the realization of organizational goals. Thus, selection, implementation, and evaluation of alternatives are key to leader and organizational effectiveness.

Effective leaders must also possess excellent problem-solving skills, and these are grounded in their cognitions. The latest approaches to understanding effective leadership have focused on these cognitions. As Leithwood et al. (1999) put it, "If we are to understand the sources of leadership practices, no source could be more fundamental than the thinking and problem-solving processes of leaders engaged in those practices" (p. 99). By linking various behaviours to these processes, it may be possible to generate more comprehensive theories of effective leadership performance. This challenge is taken up in this study. In the most general terms, this study investigates whether recent theoretical formulations about the cognition of effective leaders are evident in the problem solving of school principals. The following list summarizes the features that the literature suggested are characteristics of principals' problem solving. These revelations or expectations will be revisited in Chapter IV, where findings are compared against what the literature suggested. Let it be noted, however, that this study had a qualitative element (think-aloud protocols provided unstructured data that were analyzed using qualitative methods); hence it was reasonable to expect that new phenomena might emerge and make other theories and research relevant to the discussion of findings.

- Principals use some or all of the problem-solving processes featured in the integrated model and described in details in the literature.

- Principals use the following three problem-solving strategies: decomposition, conversion, and neutralizing factors that contribute to problem.
- Principals use judgement when solving problems.
- Principals use three types of knowledge during problem solving: knowledge of the tasks at hand, knowledge of the people with whom they work, and knowledge of the organization.
- Principals refer to values when solving problems.
- Principals use different processes, strategies, types of knowledge, and values when dealing with strategic as opposed to human relations problems.
- Principals during problem solving refer to leadership behaviours associated with a transformational and/or transactional style of leading.

CHAPTER III

DESIGN OF THE STUDY

In the preceding chapter, I presented a historical account of the most prominent perspectives on leadership inquiries that have evolved over the past century. My intention was to show how the foci of leadership studies have shifted gradually from leaders' behaviours to leaders' cognitions, affects, and values. In the cognition-focused approach to understanding leadership, some of the research has investigated the problem-solving processes of effective leaders. In the educational arena, I found, Leithwood's (1989) work was seminal. This model was complemented by a research project in the social sciences by Voss et al. (1983) and a series of investigations by Mumford et al. (2000). These three thrusts in research and theorizing provided the foundations for the theoretical framework used in the present study.

PARADIGMS

Discourse on research methods identifies key issues that each researcher must address to assume a position. Further, the discourse emphasizes that each researcher must reveal his/her "positions" to others so that they will be aware of the value orientations and assumptions that underlie the researcher's work and reports. Accordingly, what follows leads to a description of my position, my "paradigmatic profile."

FUNDAMENTAL PARADIGMATIC ISSUES

Denzin and Lincoln (2000, pp. 172-173) offered a detailed summary of the fundamental paradigmatic issues in research. Their typology contains seven issues. These are:

1. Axiology
2. Accommodation and commensurability
3. Action
4. Control
5. Relationship to foundations of truth and knowledge
6. Validity
7. Voice, reflexivity, and postmodern textual representation

The need for "positioning" lies in the fact that individuals can and do adopt different "solutions" to these problems and must adopt methods that are congruent with those solutions if their research is to be rigorous and open to accurate interpretation and critique by others.

MY PARADIGMATIC PROFILE

AXIOLOGY

Axiology is defined as the branch of philosophy that deals with ethics, aesthetics, and religion (Denzin & Lincoln, 2000, p. 169). These authors suggested that it be treated as part of the "foundational philosophical dimension" (p. 169) of a paradigmatic profile. The axiology issue, then, refers to a researcher's purposes for engaging in formal knowledge production. Denzin and Lincoln, furthermore, recognized three possible axiological stances or solutions. The first is taken by positivists and postpositivists: Knowing about the world is intrinsically valuable and is meaningful as an end in itself. The second position is taken by critical theorists and constructivists: Knowing is a means to social and individual emancipation. The third is the participatory stance: Knowing is valuable insofar as it contributes to a balancing/reconciling of the competing values of autonomy, cooperation, and hierarchy in a culture—because each can have negative effects on groups as well as individuals. My position in this instance corresponds with the first solution. One of my general objectives for this research is to investigate whether the problem-solving constructs identified in the literature are applicable to school principals.

ACCOMMODATION AND COMMENSURABILITY

This issue concerns paradigmatic purity—whether orientations and different methods can be mixed to suit the research question or the researcher. Two obvious positions are possible: that paradigms cannot be mixed, and that they can. Denzin and Lincoln (2000) supported the latter but cautioned that the axiomatic assumptions of the mixed paradigms should be the same or at the very least compatible. In that sense, positivism and postpositivism work well together, as do critical theory, constructivism, and participatory research (p. 174). In general, my belief is that combinations of paradigms can be used—indeed may be necessary—but only if the researcher's axiomatic assumptions are sustained.

ACTION

The issue here is whether there is intent to act on research results. The question is whether such intent is a potential source of contamination. Positivists and postpositivists agree that social action on the part of the researcher introduces bias, because action is "either a form of advocacy or contamination, either or both of which undermine the aim of objectivity" (Denzin & Lincoln, 2000, p. 174). These authors believed that it is the place of others to act on findings. Critical theorists have always advocated social action to varying degrees. Constructivist and participatory researchers make social action part of their work—the research becomes praxis. In fact, the research is seen as incomplete without action on the part of participants (Denzin & Lincoln, 2000). In regard to this research, I do not see myself acting as an advocate for the participants.

CONTROL

Another set of research issues relates to who controls the inquiry/study, who determines the research questions, what constitutes findings, and who determines how participants will be represented (Denzin & Lincoln, 2000, p. 175). Clearly, these concerns are intertwined with matters of voice and reflexivity. Positivists and postpositivists view voice, reflexivity, and representation as potential threats to rigor. They see insertion of the researcher's voice and thoughts as introducing bias and reject other forms of textual representation—such as found poems or artwork—because they entail emotion and subjectivity. For these researchers, every aspect of an inquiry must be under the control of the researcher. New paradigm researchers (critical theorist, constructivist, participatory) view control differently. For them, the sharing of control is indispensable to democracy and empowerment for participants. (p. 172). I see myself aligned with the postpositivists in that I did not share the sense-making effort with my participants.

RELATIONSHIP TO FOUNDATIONS OF TRUTH AND KNOWLEDGE

The discussion here brings two traditional cornerstones of research design together: ontology and epistemology. In discussing the nature of reality, being, and knowing, Denzin and Lincoln (2000) essentially contrasted modernist and postmodernist positions and then described the ontological and epistemological differences between them.

Ontologically, modernists believe firmly that there is one reality "out there"; humanity's imperfect ability to apprehend it is beside the point. This reality can only be ascertained through methods that nullify contamination (from bias, misperception, and so on), and preferably are repeatedly testable with scientific methods. Positivists and postpositivists adhere to this ontological and epistemological position. Constructivists adopt what might be called a more genuine postmodern stance on ontology and epistemology in that they are antifoundationalist: Truth is socially constructed and therefore partial, and identities are fluid. They reject the notion of one all-encompassing reality or truth, as well as any "unvarying standards" (Denzin & Lincoln, 2000, p. 177) by which truth can be universally known. A truth claim is one that is arrived at through consensus, through dialogue and negotiation. For the purposes of this study, I adhere to the positivists' and postpositivists' positions.

In carrying out this project, I saw myself as being somewhat independent from the participants. In looking at how people think and solve problems, I assumed that there is a "real" reality that underlines people's cognition. In order to find out "how things really work," I chose to be detached from the people because it was my view that I would be able to study more objectively their thinking and problem-solving process.

VALIDITY

Denzin and Lincoln (2000) addressed the conundrum of validity as it relates to new paradigm researchers. Positivists and postpositivists are depicted as holding traditional ideals of validity. When transplanted from the physical sciences into the realm of social science, they centre on the question "Are the findings rigorous?"—that is, are they reliable (can the study be replicated by other researchers?), internally valid (are extraneous variables controlled?), externally valid (are the study's results generalizable to other populations?), and objective (is the study free from bias?)? Constructivist researchers, on the other hand, solve the "goodness criteria" problem with highly specified and demarcated "authenticities" and reconstructions of validity. Because my study best relates to the positivist/postpositivist paradigm, the issue of validity is dealt with later in this chapter using the criteria of this paradigm.

VOICE, REFLEXIVITY, AND POSTMODERN TEXTUAL REPRESENTATION

The matters of voice, reflexivity, and representation are postmodern concerns. Positivists and postpositivists see this as a null issue, because they see the disembodied rational and objective voice of the researcher as the only appropriate one for a research report, to the extent that even the "I" of the researcher is reduced to a disembodied voice in the text. Consideration of voice, reflexivity, and representation lie beyond the scope of concern in the positivist orientation. Because this study is more aligned with the positivist/postpositivist paradigms, the issues of voice, reflexivity, and postmodern textual representation do not apply.

OBJECTIVES AND QUESTIONS ADDRESSED

Leithwood (1995) and Voss et al. (1983) provided initial data on leaders' problem solving. To this end, this study was designed to investigate, first, whether their findings regarding the *cognitive processes* that leaders use in problem solving can be replicated for school principals. In the literature on the problem solving of leaders, reference has also been made to the use of strategies. However, no data were available for school principals' use of problem-solving strategies. This is another aspect of leadership in which extension of understandings would be useful. Accordingly, a second objective of this study was to investigate the *cognitive strategies* that school principals use when solving problems. In the literature there have also been indications that leaders' use of problem-solving processes and strategies is mediated by leadership style and types of problem.

Further research has shown that problem-solving processes and strategies are not the only determinants of leaders' effective performance. Knowledge and the types of skills that leaders use are also significant factors of their performance (Mumford et al., 2000). This literature, though, is sparse; and very little pertains to educational organizations. Other objectives of this research were to investigate whether *leadership style* and/or *problem type* are related to variations in educational leaders' use of problem-solving processes and strategies.

In sum, this research was designed to address the following questions through an examination of a sample of school principals:

1. *What problem-solving processes do principals use to solve problems?*
2. *What problem-solving strategies do principals use to solve problems?*
3. *What types of knowledge do principals use while problem solving?*
4. *What values do principals use while problem solving?*
5. *What evidence of judgement is there in principals' problem solving?*
6. *Do principals use different problem-solving processes, strategies, types of knowledge, and values when solving different types of problems?*
7. *What characteristics of transformational and/or transactional leadership are evident in principals' problem solving?*

RESEARCH METHOD

In this section, I present an account of the methods I used to collect and analyze the data, and a description of the participants.

This study was based on the analysis of verbal reports of the thinking and problem solving of selected school principals. Verbal-report methods have been used in psychology research as reliable and valid means to make otherwise covert thinking processes available for observation, to reveal complex reasoning processes, and to understand the influence of affect on cognition (Pressley & Afflerbach, 1995). A verbal report is a problem solver's account of his or her mental processing (Ericsson & Simon, 1993). A commonly used verbal reporting procedure is think aloud: "After being presented with a problem, individuals describe aloud what they are thinking, doing, attending to, or planning in the course of solving a problem" (Kail & Bisanz, 1982, p. 246).

Results generated during the solution process are called concurrent verbalizations and, along with notes about nonverbal behaviours, they form what is called a *protocol*. According to Newell et al. (1990), "The protocol is a record of the subject's ongoing behavior". Think-aloud protocols of concurrent verbalizations were collected from 10 principals during interview sessions. For the purpose of studying problem-solving activity, concurrent verbal reports seem valuable because they provide a record of what the participant is thinking about and attending to while solving problems, and these data are not marred by changes that the participant may make after having had time to think more about the task. For this reason, this study involves the collection and analysis of concurrent verbal protocols.

PARTICIPANTS

Ten elementary and high school principals (five males, five females) participated in the study. The principals were selected following the researcher's initial contact with two school boards in Western Canada. One school board was located in an urban area, and the other was in a suburban setting. Three of the principals came from the suburban school board, and the rest were from the urban board. The boards were asked to provide the names of "effective" principals in their employ. Both school boards maintained that they considered all their principals effective and provided the names of 20 potential participants. A purposive sample was drawn from this list; principals were contacted, and those who agreed to participate formed the sample for the study. An important objective was to make sure that the sample contained a mix of age, experience, and gender; there was no intent to investigate differences associated with demographic factors.

Demographic information about the principals was collected at the beginning of the interview. Eight of the participants were elementary principals, one was a junior high principal, and one was an elementary/junior and senior high school principal. More detailed descriptions of the participants are presented in Appendix A. Five participants had between 2 and 4 years of experience as principals, three had between 5 and 8 years of experience, one participant had 9 years, one participant had 13 years of experience, and one had 21 years. In Table 2 I present the demographics of the sample.

Table 2

Principals' Demographic Information

Principal	Gender	Experience	School	Size
James	M	5 years	Elementary	>300
Karen	F	2 years	Junior high	>300
Sharon	F	2 years	Elementary	>300
Gerry	M	14 years	Junior high	>300
Wendy	F	14 years	Elementary	>300
Marina	F	3.5 years	Elementary	<300
Keith	M	2.5 years	Senior high	<300
Norm	M	6 years	Elementary	<300
Christine	F	2.5 years	Elementary	<300
Paul	M	21 years	Elementary	>300

MATERIALS

The materials in this study included a set of five cases (Appendix B) and the Multifactor Leadership Questionnaire (MLQ; Appendix C). The cases were characterized as ill structured in that the initial or goal state was not clearly stated, the problem solver had to contribute information to the solving process, there was more than one sequence of problem-solving steps that could result in a solution, and there was more than one possible solution (Taylor & Dionne, 2000).

CASES

The problems were short cases that contained one or more administrative issue that the participants were asked to identify and then solve. The cases were based on true incidents drawn directly from the life of school principals. The cases were originally written by students for a graduate Educational Administration and Leadership course offered in the Department of Educational Policy Studies at the University of Alberta. The cases drew directly from the work of school principals. Those used in this study seemed to be typical of the problems encountered by principals and are modifications of some of the original cases. Permission to use the cases was granted by the instructor of the course. These cases were further classified under two types, strategic and human relations, according to the classification scheme of Cowan (1991) and Kilmann (1989) presented in the literature review. Using the definitions of Cowan and Kilmann, I categorized the five cases under these two types. Although it is recognized that organizational problems are not pure of one type or another, I was able to categorize them based on the major issues described in each one. A reliability check with an independent judge verified the classification.

Human relations cases

Three cases were classified under this category: Case 1 is titled *"Special Needs Students"* and involves a conflict between a classroom teacher and a teaching assistant in a class with special-needs students during a social science exam. In case 4, *"What to Do About Veronica,"* the issue is service downsizing and the transfer of a teacher into a classroom with high-need students. Finally, case 5, *"Discipline Problems,"* involves the issue of disciplining a student after his/her use of abusive language toward a teacher.

Strategic cases

Case 2 is titled *"Introducing Change,"* and it involves the issue of changing a school's philosophy from a traditional mode to a more inclusive one. The focus of case 3, which is titled *"Budget Constraints,"* is the impact of financial constraints and low enrolment along with a restructuring policy on staff empowerment.

MULTIFACTOR LEADERSHIP QUESTIONNAIRE (MLQ)

The Multifactor Leadership Questionnaire was used to portray the principals' leadership style quantitatively—as a complement to the qualitative descriptions extracted from the think-aloud protocols. The *MLQ - Leader Form* was administered to each principal, and the *MLQ - Rater Form* was administered to the teachers at each of the participating schools. Teachers' participation in filling out the questionnaire was voluntary. Because teachers' participation in completing the MLQ was voluntary, not all teachers from each school participated. The MLQ was scored according to scoring procedures that are described in the manual (Bass & Avolio, 1995).

A five-point scale for rating the frequency of observed behaviours is used to score the questionnaire. A score of 0 indicates that the leader *"not at all"* practices one of the dimensions of leadership. A score of 1 indicates that the leader *"once in a while"* practices one of the dimensions of leadership. A score of 2 indicates that the leader *"sometimes"* practices one of the dimensions of leadership. A score of 3 indicates that the leader *"fairly often"* practices one of the dimensions of leadership, and a score of 4 indicates that a leader *"always"* practices one of the dimensions of leadership. The higher the score in all of the leadership dimensions, the more likely those styles of leadership practices are taking place. High scores in satisfaction, extra effort, and effectiveness would imply that leaders are perceived as effective.

Confirmatory factor analysis has been used to determine the instrument's validity and reliability. Based on past findings, "reliabilities for the total items and for each leadership factor scale ranged from .74 to .94" (Bass & Avolio, 1995, p. 9). The two reviews of the MLQ (Bessai, 1995; Kirnan, 1995) in the *Twelfth Mental Measurement Yearbook* each provide reasonable psychometric properties for the MLQ. For the self-rating form, alpha reliability coefficients ranged from .60 to .92. Test-retest reliability over a six-month period ranged from .44 to .74 for the Self-Rating form and from .52 to .85 for the Rater Form.

The construct validity of the MLQ was demonstrated through high intercorrelations among the five transformational factors (.85) and lower correlations between the transformational and transactional factors. Evidence of criterion-related validity was also reported through the correlation of the eight factors (transactional and transformational) with three criterion variables (extra effort, effectiveness, and satisfaction; Bass & Avolio 1995, p. 15). Transformational leadership scales were highly correlated with all criterion variables. Of the three transactional factors, only contingent reward correlated positively with the criterion variables, although to a lesser extent. The two scales of *management-by-exception* (active and passive) and *laissez-faire* were negatively correlated with these variables.

DATA COLLECTION

PROBLEM SOLVING

Data from participants were collected with a think-aloud procedure. Following Ericsson and Simon (1993), all participants were prepared for the think-aloud activity in a brief training session designed to familiarize them with the procedure. At the training session, which preceded the actual problem-solving activity, participants were given a short problem and were asked to think aloud while solving it (Appendix B). The problem was presented to them in written form. At the end of this session, participants were handed the cases and were asked to read them aloud, and then to think aloud describing how they would respond to each one. Participants were specifically instructed to try to express all their thoughts from the moment that they were handed the cases until they had finished dealing with them. Problem-solving sessions lasted between 60 and 90 minutes. All sessions were audiotaped and subsequently transcribed with consent of the participants.

MLQ

At the end of the problem-solving session, principals were asked to complete the *Leader Form* of the Multifactor Leadership Questionnaire (MLQ). Teachers at the participating principals' schools completed the *Rater Form* of the MLQ. Teachers' participation was voluntary. In total, 76 teachers from 10 schools completed the MLQ. A minimum of 4 and a maximum of 19 teacher responses of the MLQ were obtained per principal. The *Leader* and the *Rater* Forms of the MLQ were scored according to scoring procedures described in the manual.

DATA ANALYSIS

THINK ALOUD RECORDS

Interview data were processed in three phases. In the first phase, after the tapes were transcribed, the participants were asked to read the transcripts to verify the accuracy and completeness of the content.

In the second phase, sentences and parts of sentences were marked and coded for evidence of problem-solving processes. I did this by both reading the manuscripts and applying a computer program for qualitative analysis of unstructured data—Atlas.ti. Initially, I looked for the problem-solving processes that are in the *a priori* model described in Chapter II.

In phase three I extended the analysis to accommodate Pressley and Afflerbach's (1995) contention that there are two advantages to building on previously developed categories: (a) The methodology of an investigation is strengthened not only by applying *a priori* categories, but also by elaborating and refining those categories as more categories emerge across the data; and (b) initial conceptualizations of the cognitive phenomena that are being studied can be enriched by integrating new patterns in the data. Accordingly, the transcripts were also screened for segments that evidenced "new" categories, which were then examined to determine how they fitted the *a priori* framework. Whenever new categories emerged, they were integrated into or added to the initial framework.

In the fourth phase I reviewed each interview as a whole to determine whether broader thematic units could be extracted that would further describe the participants' thinking and problem-solving processes.

MLQ

The Multifactor Leadership Questionnaires for the principals and their teachers were scored according to specific procedures outlined in the manual for the instrument (Bass & Avolio, 1997). The averages of the Rater Forms per principal in the three categories of leadership (transformational, transactional, and laissez-faire) and the three outcomes of leadership (extra effort, effectiveness, and satisfaction) were first obtained, and subsequently were combined with the Leader Form (one per principal) to develop the MLQ profile of each principal.

ENSURING CREDIBILITY

The criteria for judging an inquiry's credibility are determined by the underlying paradigm. Criteria developed from conventional axioms and appropriate to conventional studies may be quite inappropriate and even irrelevant to naturalistic studies and vice versa. The criteria used to test rigor in the conventional paradigm are well known. They include controlling the effects of extraneous variables in the inquiry (internal validity), its applicability (external validity or generalizability), its consistency (reliability), and its neutrality (objectivity). These four criteria, when met, prevent problems of confounding, atypicality, instability, and bias, respectively. Epistemological, ontological, and methodological differences between the conventional and naturalistic paradigms make necessary the use of rigor criteria uniquely suited to each paradigm. For the purposes of this study, the criteria used to test the rigor of the research measures are those of the positivist/postpositivist paradigm. In what follows, I describe how these criteria were met in my study.

VALIDITY AND RELIABILITY OF THE RESEARCH MEASURES

In the present study, I used two measures to collect and analyze data: a standardized instrument (Multifactor Leadership Questionnaire-MLQ) and verbal reports. In a previous section of this chapter, I reported issues of validity and reliability of the MLQ. In this section, I describe the steps I took to minimize threats to reliability and validity of the verbal protocols. A number of researchers have described certain guidelines for the collection and interpretation of verbal data. These guidelines relate to instructions, warm-up exercises, tasks, the use of probes, and the analysis of data.

INSTRUCTIONS

Carefully worded instructions are critical to the generation of reliable and valid verbal reports (Ericsson & Simon, 1993). In studies of problem-solving, instructions to problem solvers should emphasize a general reporting of everything that they are thinking and should avoid requests to report specific aspects of thinking or to explain or justify the thinking process (Ericsson & Simon, 1993; Taylor & Dionne, 2000). Problem solvers should be encouraged to be comfortable in reporting their thinking in their own words (Van Someren, Barnard, & Sandberg, 1994). Furthermore, to optimize reliability, instructions should be standardized so that all participants in a study receive the same instructions (Ericsson & Simon, 1993; Pressley & Afflerbach, 1995).

In the present study, participants were given instructions to report everything that came to mind from the time they were handed the cases until they had finished working with them. All participants received the same instructions in both written and verbal from (Appendix B). The participants were not interrupted during their thinking-aloud sessions to explain or justify their thinking. Given the good rapport established between the principals and me at an earlier meeting, I have no reason to believe that the participants felt uncomfortable in expressing themselves during the interview sessions.

WARM-UP EXERCISES

Because people vary in their ability to verbalize thinking (Pressley & Afflerbach, 1995), warm-up exercises are important in generating quality verbal reports (Taylor & Dionne, 2000). Warm-up exercises require less than 15 minutes and have several benefits. First, they ensure that the instructions for generating verbal reports have been understood and that researchers and participants share the same understanding of the kind of data required (Ericsson & Simon, 1993). Second, warm-up exercises reduce anxiety (which may interfere with task performance) and make participants feel more comfortable in reporting their thinking (Ericsson & Simon, 1993). Third, they minimize the frequency of interruption or prompting during data collection (Pressley & Afflerbach, 1995). To maximize reliability, warm-up procedures should be standardized across participants, and they should be similar to the target task (Ericsson & Simon, 1993; Van Someren et al., 1994).

All participants in the study received a brief warm-up exercise (Appendix B) before they engaged in the actual task. The exercise consisted of a brief case, similar to the ones they were asked to work on afterwards, and it contained the same instructions for verbalizing their thoughts as described above. Participants worked on the warm-up case for approximately 10 minutes, and when they were comfortable with the process, they moved on to the actual research cases.

TASKS

Characteristics of the tasks can influence verbal reports (Ericsson & Simon, 1993). Tasks should be novel and moderately difficult, in order to elicit conscious processing (Pressley & Afflerbach, 1995). In addition, Bainbridge (1990) recommended authentic tasks, and Van Someren et al. (1994) cautioned against tasks that require solvers to work unusually quickly. These conditions optimize reporting from short-term memory (STM) and maximize the richness of the data (Taylor & Dionne, 2000). Therefore, tasks should be carefully selected according to these guidelines and to the expertise and experience of the participants in each investigation (Pressley & Afflerbach, 1995).

The tasks in this study were cases that drew directly from the work of school principals. The cases were selected because they contained a variety of issues with which school principals deal often. To test for the degree of difficulty, I conducted a pilot study. Three school principals with 5-8 years of experience, who did not participate in the study, were asked to read and comment on the reality and clarity of the cases. Their comments, which consisted mainly of clarifications, were incorporated in the revision of the cases.

USE OF PROBES

Ericsson and Simon (1993) suggested that comments by the researcher during the think-aloud procedure should be infrequent and neutral to minimize interruptions of processing. Prompts are necessary only if the problem solvers cease to verbalize for more than 10-15 seconds (Ericsson & Simon, 1993). To minimize prompting effects, neutral and unobtrusive prompts such as “Keep talking” are preferable. To further reduce prompting effects, prompts may be standardized by selecting specific prompts to be used during data collection (Ericsson & Simon, 1993; Pressley & Afflerbach, 1995).

In this study, probing was infrequent and was provided only after participants had stopped talking for more than 10 seconds. The prompt used to bring participants back into the verbalizing process was the phrase "*Remember to think out loud,*" and it was used consistently across participants when needed.

ANALYSIS OF THE DATA

The research literature suggested three major guidelines to protect reliability and validity throughout the data analysis process. First, verbal reports should be transcribed verbatim, capturing as many verbal nuances as possible by including pauses, emphases, and indications of tone (Ericsson & Simon, 1993; Pressley & Afflerbach, 1995; Van Someren et al., 1994). A second guideline concerns the development of a valid coding grid to identify major processes and patterns of knowledge in the data collected. Data coding can be achieved with a minimum loss of validity when the coding grid is developed from the data, represents theory, and once developed is checked against further data (Ericsson & Simon, 1993; Pressley & Afflerbach, 1995).

In studies of extensively researched cognitive processes such as problem solving, previously developed coding grids can provide the framework for the analysis of new data (Taylor & Dionne, 2000). The advantage of this is twofold: The methodology can be strengthened by applying, elaborating, and refining a common coding across data; and the conceptualization of the particular cognitions being studied can be enriched by the analysis of new data (Pressley & Afflerbach, 1995). Third, the reliability of the coding grid can be enhanced by the use of clearly defined codes, illustrated with examples (Kail & Bisanz, 1982; Pressley & Afflerbach, 1995; Van Someren et al., 1994). The reliability of the coding procedure can be tested by determining the degree of agreement between two or more independent coders in assigning codes to data files (Bainbridge, 1990; Ericsson & Simon, 1993; Pressley & Afflerbach, 1995; Van Someren et al., 1994).

In this study, verbal reports were first transcribed, including notes about pauses and comments that participants made during the thinking-aloud process. Second, a coding scheme was developed that corresponded to the elements of the problem-solving processes of the synthesized model. Third, this coding scheme was pilot tested on the transcripts of 10 think-aloud protocols (2 principals x 5 problems) using two independent judges; one was a principal who did not participate in the study, and the other was a graduate student. The reliability of their coding was tested by checking the degree of agreement between the two judges in assigning the codes to the transcripts. Reliability of the coding fell between .89 and .97. Finally, the reliability of coding of the "real data" was tested through intercoded checks. Agreement ranged between .9 and .96. Where discrepancies emerged, the coding was adjusted accordingly.

LIMITATIONS

Limitations are restrictions over which the researcher has little control. This study was limited by the degree to which generalizations can be made from the information collected. The number of participants and the unequal distribution between elementary and high school principals caution against generalizing the results of the study to junior high and high school principals. The number of participants militates against the investigation of differences associated with demographic variables.

Another limitation related to the participants' ability and willingness to respond truthfully and voice accurately and completely the thoughts that went through their minds while solving the problems. The study was also limited by the measurements used to collect data. The five cases used for the collection of the verbal reports were descriptive of a particular cultural context and may not represent adequately other contexts. By the same token, the questionnaire that was used to collect information about the participants' leadership styles was also limited to assessing a set of behaviours and may exclude others.

DELIMITATIONS

This study was delimited by its focus on school principals from two school boards located in Western Canada. The data-gathering process was delimited to only one interview with each participant that occurred over a three-month period. Data about the participants' background, school characteristics, and on-site observations of their administrative practice were not included in the study. This study was also delimited by its focus on the problem-solving processes, strategies, knowledge structures, and values as presented in the theoretical framework. To keep this study manageable, I chose not to examine the variables of judgement, socio/political/economic context, and the influence of job experience and expertise.

ETHICAL CONSIDERATIONS

This study was conducted according to the ethical guidelines of the University of Alberta. Before the study was undertaken, a research proposal and ethics application were submitted to and examined by the Ethics Review Committee in the Department of Educational Policy Studies. Several other measures were taken to comply with ethical procedures. First, approval to conduct the study was sought and granted by the two school boards. Second, voluntary consent was obtained from each principal in this study. Principals were briefed about the purpose and the procedures of the research in general and the interviews in particular and were given the opportunity to ask any pertinent questions. Third, all participants, including both principals and teachers, were assured of complete confidentiality. The names of the participants and the corresponding schools were changed for ethical reasons. In addition, no specific geographical locations or dates were provided in the study to prevent information from being traced back to the informants.

CHAPTER IV

RESULTS

In this chapter, I present the findings in six sections, wherein the research questions addressed are as follows:

- *What problem-solving processes do principals use to solve problems?*
- *What problem-solving strategies do principals use to solve problems?*
- *What types of knowledge do principals use while problem solving?*
- *What values do principals use while problem solving?*
- *What evidence of judgement is there in principals' problem solving?*
- *Do principals use different problem-solving processes, strategies, types of knowledge, and values when solving different types of problems?*
- *What characteristics of transformational and/or transactional leadership are evident in principals' problem solving?*

In each section I lay out both the findings that emerged when the data were examined through the lens of the theoretical framework described in Chapter II and findings that lie outside the model of problem solving that I derived from the literature. Pseudonyms for each principal were used in order to ensure anonymity. Finally, in accordance with the limitations noted in Chapter III, differences between demographically distinct participants were not explored.

PROBLEM-SOLVING PROCESSES

Research question 1:

What problem-solving processes do principals use to solve problems?

The processes that drove the first phase of analysis of the protocols are those of the synthesized model that I presented in Chapter II. Principals were expected to use some or all of those processes. The findings presented in Table 2 reflect the extended phase 3 analysis and therefore include new categories. A detailed description of each process follows.

Table 3

Frequencies and Percentages of Problem-Solving Processes

Problem-solving processes	f	%
Representing problem	14	2.8
Stating subproblems	45	9.1
Stating constraints	10	2.0
Stating solutions	155	31.3
Evaluating	10	2.0
Summarizing	12	2.4
Elaborating/stating reasons	74	14.9
Presenting alternative or hypothetical scenario	28	5.6
Making assumptions	19	3.8
Using metaphors/analogies	14	2.8
Stating facts from experience	53	10.7
Being proactive	12	2.4
Total	494	100

REPRESENTING THE PROBLEM

Statements in the principals' protocols that were coded as indicators of this process reflected how principals understood the problem before they engaged in the solving process. Examples of this process can be found in the following comments:

> *The problem in this particular one is probably more related to the communication that hasn't gone around. (Karen, problem 2)*

> *The problem I see straight away is that the superintendent is going to have this teacher put under his influence. (James, problem 4)*

In the first example the problem was represented as a lack of communication; in the second it was identified as a political one. Eight principals used this process during problem solving. In general, principals used this process either at the beginning of their analyses or at the end. For example, James identified a problem at the beginning of his analysis of problem 1:

> *What I see here is a difference probably in role description.*

Norm, however, did not refer to this process until the end of his analysis of problem 2:

> *The problem with this case is how it was set up in the beginning.*

Paul referred indirectly to this process while he was working on a solution to problem 1:

> *We would sit down and I would probably start with talking a little bit about the roles and responsibilities. I think that's important.*

For Paul the problem was in the roles and responsibilities of the people involved.

This process can be understood better by comparing it with the process "stating facts from experience." When principals had encountered similar experiences in the past, they did not articulate this process. Rather, they indicated that they knew how to solve the problem based on that previous experience.

STATING A SUBPROBLEM

This categorisation was used when it appeared that the principals identified a particular factor as a subproblem. All principals identified subproblems during problem solving, but some identified more than others. For example, Wendy referred to 13 subproblems in the set of five cases, whereas James, Karen, and Marina identified 3 subproblems. This category was evident in such statements as:

> *Another problem that is of importance here is the whole dynamic between the superintendent and the principal. (Karen, problem 5)*

This example shows that, while Karen was working on the analysis of the discipline problem (problem 5), she identified the relationship between James and the superintendent as a minor problem that she would address later. Principals tended to identify subproblems in two ways. They either stated a subproblem while breaking down the main problem, or they "encountered" subproblems when they were exploring the implications of a proposed solution. For example, Sharon, while working on a solution to problem 1, identified the issue of "communication strategies" as a subproblem:

> *[I will not] just focus on this main problem, but focus on the underlying problems, focus on maybe communication strategies. (Sharon, problem 1)*

Principals sometimes stated subproblems explicitly, sometimes implicitly. An example of an implicit subproblem is evident in this excerpt:

> *I'm thinking about the tension that escalated to such a degree. I guess my thought is that principals need to walk through their classrooms frequently. They need to talk to their staff frequently. (Gerry, problem 1)*

This statement implies that Gerry perceived lack of supervision and communication as a subproblem.

STATING CONSTRAINTS

This process was used when principals identified a constraint to problems. This process accounted for a small number of statements in the principals' protocols and was evident in statements such as:

> *You know, either we have the money or we don't. And this is how it is. (Gerry, problem 3)*

> *I think there comes a point as well if the mandate for the principal is that—and depending on whether the school district says you have to do it, you do it. (Christine, problem 2)*

> *You know it's not possible to hire more teachers or now to re-timetable, so you're going to try and make the best you can with what you have. (Karen, problem 2)*

Principals also converted constraints into subproblems. The following examples illustrate how principals converted a constraint into a subproblem:

> *The only avenue we really have is to keep on pressuring for more government money, so that we can drop the class size. (James, problem 3)*

> *There is really nothing we can do about it. She has to teach what's given to her. Of course we will give all the support we can. (Paul, problem 4)*

In these examples, the constraints "lack of money" and "teaching restrictions" could be alleviated by pressuring for more government money and providing more support respectively.

STATING SOLUTION

When principals proposed a solution either to the given problem or to a subproblem, this code was assigned to the statement. The following are indicative of this process:

> *I think the first thing I would do here is to bring the people together to sort of articulate what the teacher's role is and what the teaching assistant's role is. (Paul, problem 1)*

> *I would work at separating the issues, to say to the teachers, "I support you in terms of helping kids take responsibility for their actions." (Wendy, problem 5)*

> *I would bring in the teacher and probably talk about the dissatisfaction, . . . and we could possible look into what's called an administrative transfer. (Paul, problem 4)*

Providing solutions to subproblems was evident when Sharon identified the issue of "negativity" as a subproblem in problem 2. She then proceeded to solve the problem by proposing that she would go to the negative people and try to understand them. Principals also offered solutions to assumptions. For example, Karen based a part of her solution to problem 1 on this assumption: *"I'll just assume that a separate meeting will take place."*

EVALUATING

One way that principals justified their proposed solutions was by presenting examples from their experience with similar problems. An example of this is in the following excerpt:

> *I have done [that] successfully before, so I based my choice on success. (Sharon)*

Apart from justifying their proposed plan of action, principals also evaluated problems immediately after having finished reading them and before starting to solve them. Examples of this are in the following three quotations:

> *I think that the whole approach here is faulty. (Wendy, problem 2)*

> *For me, this doesn't seem to be terribly complex. (Keith, problem 1)*

> *But yet the superintendent has made that request, and I find that very unusual. I don't think that would happen. (Christine, problem 4)*

With the previous statement, Christine made her judgement about a certain aspect of the problem.

SUMMARIZING

This category of responses occurred infrequently in the principals' protocols. It seems that this process has an integrative function in that the principals used it to put closure on a series of previous statements, in effect stating, "Here is where I am so far." This process also helped principals to recapitulate and synthesize in their minds all issues that they considered important for solving particular problems. Evidence of this process is in the following statement:

> *So, through supervision, checking in myself, and also probably getting the school involved, . . . see if we can all just be monitoring that. (Marina, problem 1)*

> *To sum up, I'll need to meet with her to find out what her concerns are and what options we have. (Keith, problem 4)*

ELABORATING/STATING REASONS

Principals used this process to justify their proposed solutions, a subproblem, or a problem representation. The 10 principals provided elaborations at different stages during problem solving. Principals differed in the number of reasoning statements to which they referred. Sharon, for example, in problem 1, elaborated on the subproblem of the teaching assistant, whereas James used this process to elaborate on his problem representation. Thus, after problem 3 was represented as a communication issue, James elaborated with this statement:

> *People feel left out if they can't take part in the decision-making process and they're unhappy about it.*

This process provided rich insights into the principals' thinking. The following examples illustrate how principals used this process:

> *When you go into a school, you do not change philosophy. You do not change the focus. You listen, you learn, you watch, you observe, you soak it up like a sponge. You become part of what is already there. You blend into the walls. On occasion, you do have to assert in certain areas, and you go with the flow. You see where there are possibilities of doing things differently. (Sharon, problem 2)*

In this example, Sharon elaborated on how change is to be introduced at a school in order to have a positive effect. This statement came after she had indicated previously that the way that change had been dealt with was faulty and after she had talked about how she would solve the problem.

Another example of this process is in the following excerpt:

> *Many teachers do accept that our main mission these days is to take a group of kids and help them go as far as they can as individuals. If we have a really good grasp of the curriculum, then we should be able to provide learning activities in ways that allow kids to work at whatever level they are at. (Norm, problem 3)*

In this instance Norm elaborated on the general issue of the school mission after he had stated how to solve the subproblem of combined classes to which problem 3 referred. In yet another example, Karen, while working on problem 2 (introducing change), explained why she thought it was important for her as a principal to include all interested parties in the change process:

> *Because if we don't allow people to express their views, then I think we don't help them grow. And it's certainly very prevalent in that there are many benefits to them. You help to see, help to broaden stakeholders' perspectives, and I think that's a very healthy thing to do.*

PRESENTING AN ALTERNATIVE OR HYPOTHETICAL SCENARIO

Principals used this process to provide alternative approaches to solutions they had proposed, or as hypothetical solutions to account for information not available to them. The following excerpt illustrates this process:

> *My way of dealing with this would be to not say to the staff that we are going to make this change immediately, but to say that we have a mandate to look at inclusive schooling, and to engage the staff in actually exploring the whole concept of inclusive schooling and how we might, as a school, achieve the model of inclusive school. (Karen, problem 2)*

In this example, Karen stated a different approach to the problem on which she was working. In the following two examples, Keith and Christine worked on hypothetical scenarios for solving the problems:

> *If Emily comes back the next day and says, "I just can't work with this [teacher]," then we may have to look for a switch. (Keith, problem 1)*

> *If the superintendent is indicating to me that I have to place her there, I may not have a choice, and I may need to sit down with the teacher and indicate to her that "We'll have as many supports in place for you to make this a successful opportunity." (Marina, problem 4)*

MAKING ASSUMPTIONS

Principals used this process when they made inferences about parts of the problems that were unclear or missing. Assumptions were also used to guide their thinking during the solving process. For example, principals made assumptions regarding the timing of event:

> *I'm assuming that this is happening in June. (Karen, problem 2)*

They also referred to other aspects of the problems. In the latter, principals relied on assumptions to explore avenues to solve the problems. In some instances, the assumptions that principals made were drawn from their past experience, and they were either explicit or implicit. Principals used this process to assist them mainly with the process of stating solutions. It seems that before principals started the analysis of the problem, they wanted to make sure that they addressed all missing or incomplete information. In this case, principals first made assumptions and then used these assumptions to develop a solution plan to solve the problem. The following two statements illustrate the use of this process:

> *I'm assuming that this school policy should have the support, if it's under the umbrella of the jurisdiction policy, of the parents and the staff, and have communicated very clearly to students, staff, and parents. (Christine problem 2)*

In this example, the principal made the assumption that all stakeholders should support the school policy while she was working on the solution of problem 2.

> *I'm going to assume, furthermore, that this school had a school council, and in my jurisdiction one of the things that the school council does is to review the school discipline code, and so I'm going to assume for the purpose of this that the behaviour code of the school was probably drawn up mostly by staff. (Keith, problem 5)*

In this example, Keith made assumptions about the school council reviewing the discipline code before he stated his proposed solution. Furthermore, this principal made this assumption based on his previous experience regarding the role of school councils in the area of discipline.

USING METAPHORS/ANALOGIES

Principals used metaphors and analogies to further illustrate and support the reasoning process of elaborating/stating reasons. The following statements illustrate the use of this process:

> *I think that people who want to make changes in schools seem to think that teachers could just do this and they're going to do it, forgetting that the teachers are the experts. I mean, you wouldn't do that to doctors. You wouldn't say to a doctor, "Now we're going to change the medical procedure." (Keith, problem 2)*

In this example, Keith used the analogy of doctors to illustrate an elaboration he had just made. Similarly, Gerry, while working on problem 3 (budget constraints), used the analogy of home budget to support an elaborative statement made earlier about involving parents, students, and teachers in the budgeting process:

> *I often ask them to take a look at what happens in their home with budgeting. You've got a pay cheque that comes in, we only have so much money to run the family and, yes, we'd like to take that trip to Hawaii. But we sort of make some decisions about what we can and cannot do. (Gerry, problem 3)*

STATING FACTS FROM EXPERIENCE

To support their proposed solutions, principals referred mainly to examples from their experience. All principals used this process during their solving activity. Interestingly, two principals started the analysis of three of the five cases by referring to examples from previous experiences. These examples referred either to past experiences with a similar problem or to a current situation at the principals' schools. Examples of this are found in the following statements:

> *What we've done here is to build what we call "school family," and with that "school family" we have the parents and the kids try and work together as a team. (James, problem 5)*

With this statement James described how discipline was handled at his previous school through a program that involved parents, students, and staff. In the following example, Sharon used this process at the end of her solution. In this case, the example that she used justified her proposed solution:

> *We are building that here right now. I'm looking at a five-year line before the program we're offering is at a point where it is truly effective. (Sharon, problem 2)*

BEING PROACTIVE

With this process the principals identified the actions they would have taken to prevent the problem from taking place in the first place. The following excerpts are examples:

> *The only thing that probably could have stopped this from happening in the first place is, at the very beginning, prior to the teacher aide taking that role, sitting down with the teacher aide and saying, "This is what we are expecting in the*

> *school" and having them understand how they fit into the school situation. (James, problem 1)*

> *This is a situation that certainly could have been avoided had proper planning taken place. (Karen, problem 2)*

> *You're having to address a situation that certainly could have been avoided had it been the sharing of information, the warming up of the idea, and involving people in addressing a situation from the start. (Karen, problem 2)*

CLUSTERS OF PROCESSES

I found that the above set of discrete processes could be clustered into three general categories based on how they were used in the principals' problem solving. These categories are: problem construction, plan formation and execution, and regulation.

PROBLEM CONSTRUCTION

This category comprehends three problem-solving processes: representing the problem, stating the subproblem, and stating constraints. From the analysis of the protocols it became evident that the principals tended to use these three processes to generate a representation and understanding of the problem and to identify its parameters.

PLAN FORMATION AND EXECUTION

Seven processes are included in this category: stating solutions, presenting an alternative/hypothetical scenario, making assumptions, using metaphors, elaborating/stating reasoning, stating examples from experience, and summarizing. These processes, in concert, allowed the principals to formulate and carry out a detailed plan for addressing the stated problem or the represented problem.

REGULATION

Regulation refers to monitoring and controlling of the solving process according to the plan that was formulated earlier and also evaluating the plan and its appropriateness at implementation. The two processes that comprise this component are evaluating and being proactive.

By way of a final comment concerning these findings, this three-fold typology could be seen as attributing a linearity to problem solving. However, no set sequence(s) was (were) evident in the principals' protocols. This will be shown in the next section, where I report how the principals organized sets of processes into distinctive strategies.

PROBLEM-SOLVING STRATEGIES

Research question 2:

What problem-solving strategies do principals use to solve problems?

To investigate whether the principals used distinctive strategies, I developed flow charts from the protocols (see below) that showed how each participant combined the problem-solving processes to address each of the five cases. These charts were then examined for patterns or regularities—in and across protocols—that could be called strategies. Principals were expected to use three main problem-solving strategies, as presented in Chapter II (decomposition, conversion, and identifying and eliminating factors that contribute to problem).

In the end, four problem-solving strategies emerged from the data. I have designated them conversion, decomposition, reversion, and solution oriented. Table 4 summarizes the findings regarding the strategies that the principals used during problem solving. According to this table, the most frequently used strategy was the solution oriented followed by the strategies of conversion, decomposition, and reversion.

Table 4

Problem-Solving Strategies Across Problems and Participants

Strategies	Case 1	Case 2	Case 3	Case 4	Case 5	f	%
Conversion	3*			2		5	10
Decomposition	1			1	3	5	10
Reversion		3	1	1	1	6	12
Solution oriented	6	7	9	6	6	34	68

* The numbers correspond to principals/

CONVERSION

In conversion, the principals converted a stated problem into a new issue that they subsequently solved. Five principals used the strategy of conversion during problem solving. After comparing the charts, it became apparent that the principals who used this strategy referred to the process "representing problem" early on in their solving. In Figure 2, I present an example of how one principal used this strategy to solve case 1.

DECOMPOSITION

In decomposition, principals broke the problem into one or more subproblems, which they addressed by proposing related solutions. As with conversion, principals did not use this strategy frequently; five principals used this strategy. After comparing the charts, it became apparent that the principals who used this strategy referred to the process "stating subproblems" when using this strategy in problem solving. In Figure 3, I present an example of this strategy.

REVERSION

The reversion strategy tends to be initiated when a principal starts the analysis of a problem by focusing on the steps he/she would have taken to prevent the problem from getting to its present state. Six principals used the reversion strategy. The definitional feature of this strategy is early use of the process "being proactive." All nine principals used this process in at least some of their problem solving. An example is presented in Figure 4.

SOLUTION ORIENTED

With the solution-oriented strategy, the principals focused exclusively on identifying a particular solution to the problem. Although identification of a solution is at the core of principals' problem solving, regardless of the strategy used, some of the protocols were dominated by the plan(s) proposed for solving the problem. Salience of the process "stating a solution" is the hallmark of this approach to problem solving. There were thirty-four incidents of this strategy in the principals' protocols, and it was therefore the most frequently used problem-solving strategy. An example of this strategy is presented in Figure 5.

Figure 2
Problem 1: Special Needs Students
Principal : James
Strategy: Conversion

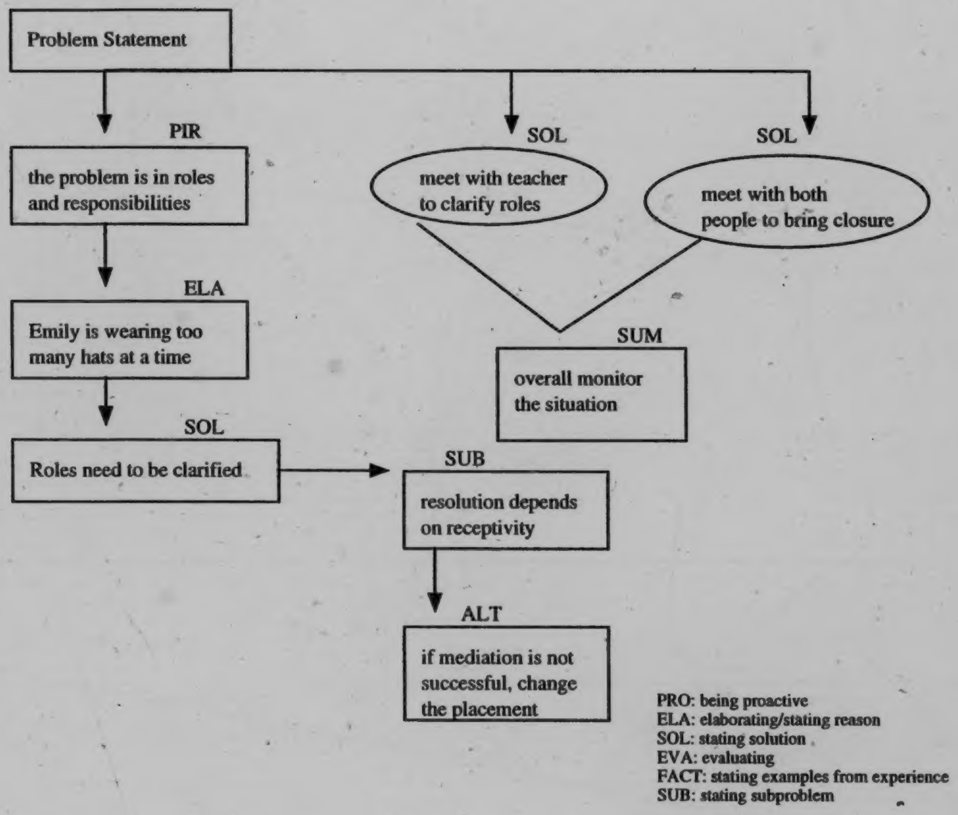

Problem Statement
PIR
the problem is in roles and responsibilities
ELA
Emily is wearing too many hats at a time
SOL
Roles need to be clarified
SOL
meet with teacher to clarify roles
SOL
meet with both people to bring closure
SUM
overall monitor the situation
SUB
resolution depends on receptivity
ALT
if mediation is not successful, change the placement
PRO: being proactive
ELA: elaborating/stating reason
SOL: stating solution
EVA: evaluating
FACT: stating examples from experience
SUB: stating subproblem

Figure 3
Problem 1: Special Needs Students
Principal E
Strategy: Decomposition

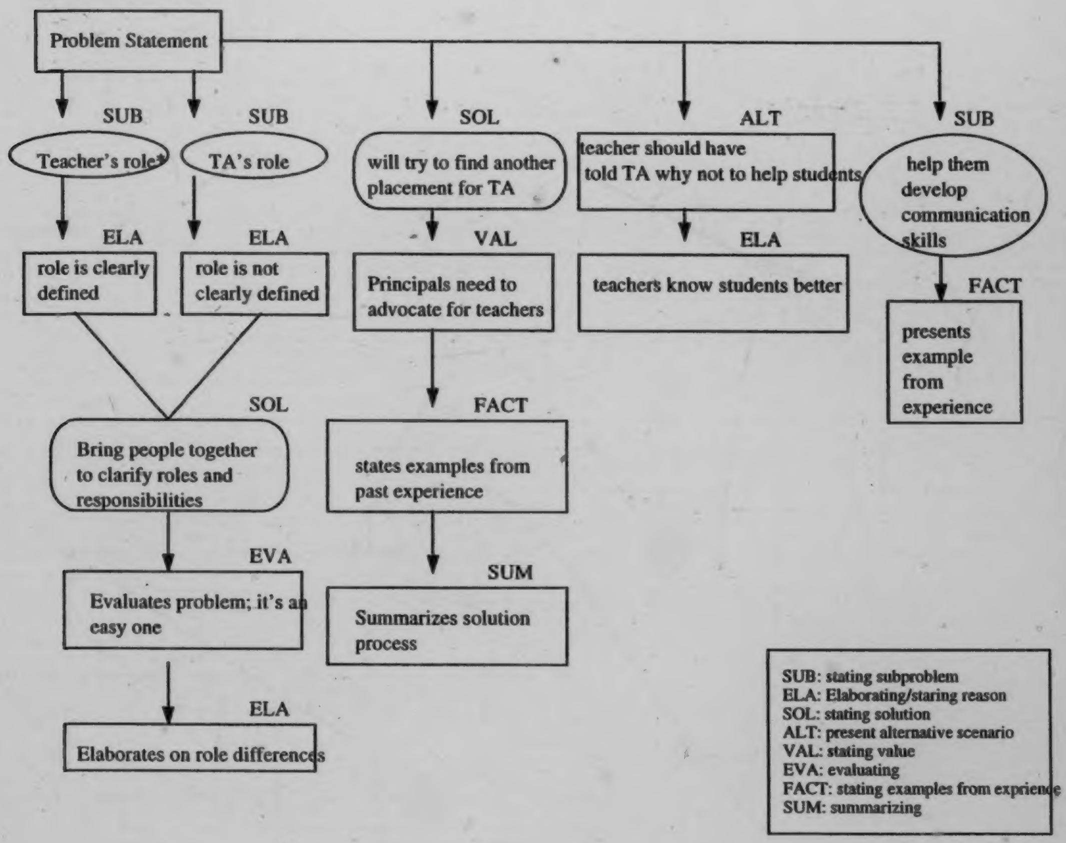
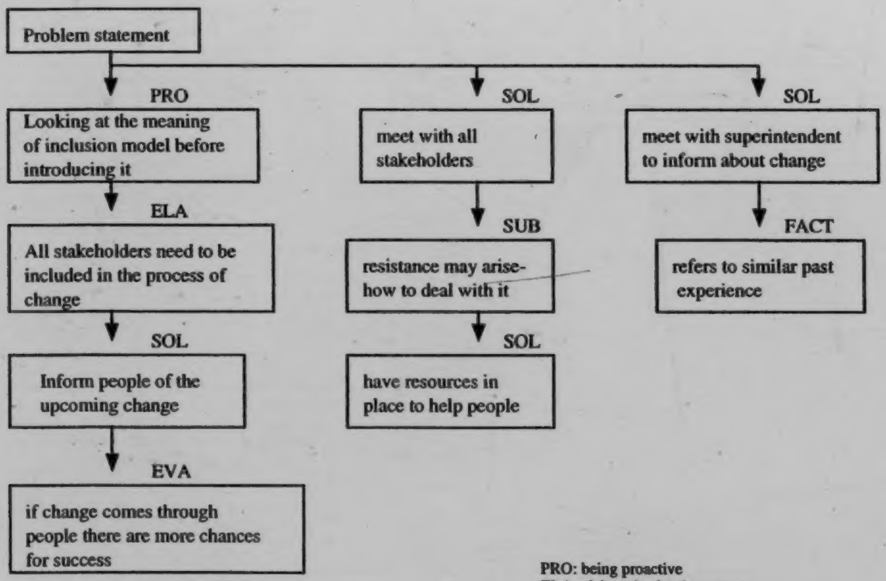
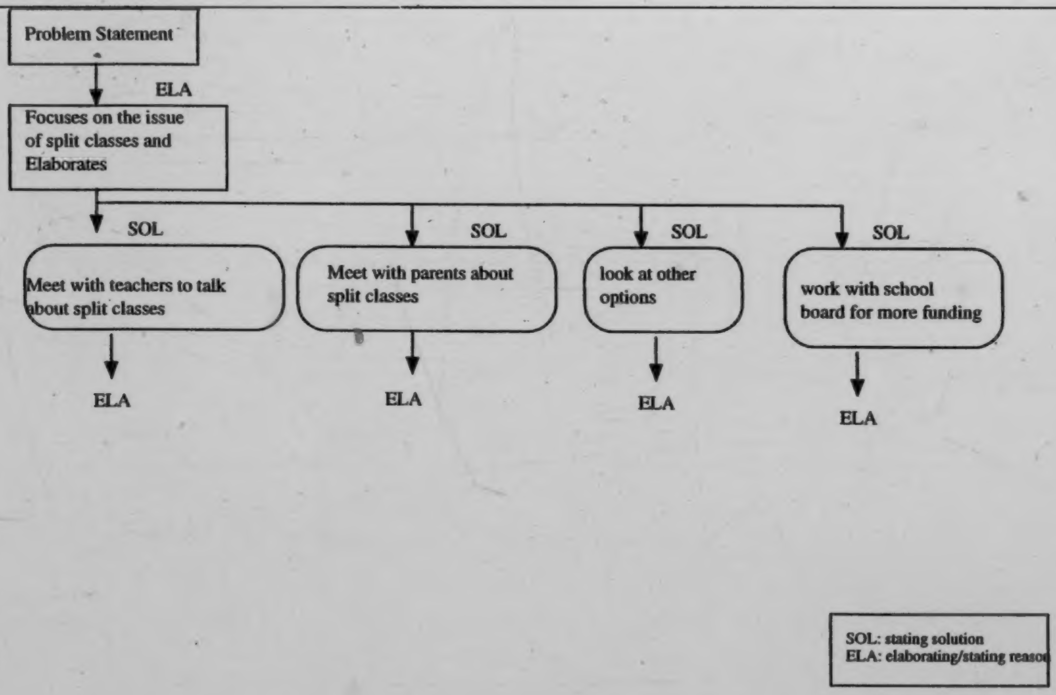

Problem Statement
SUB
Teacher's role
SUB
TA's role
SOL
will try to find another placement for TA
ALT
teacher should have told TA why not to help students
SUB
help them develop communication skills
ELA
role is clearly defined
ELA
role is not clearly defined
VAL
Principals need to advocate for teachers
ELA
teachers know students better
FACT
presents example from experience
SOL
Bring people together to clarify roles and responsibilities
FACT
states examples from past experience
EVA
Evaluates problem; it's an easy one
SUM
Summarizes solution process
ELA
Elaborates on role differences
SUB: stating subproblem
ELA: Elaborating/staring reason
SOL: stating solution
ALT: present alternative scenario
VAL: stating value
EVA: evaluating
FACT: stating examples from exprience
SUM: summarizing

Figure 4
Problem 2: Introducing change
Principal: James
Strategy: reversion


Problem statement
PRO
Looking at the meaning of inclusion model before introducing it
ELA
All stakeholders need to be included in the process of change
SOL
Inform people of the upcoming change
EVA
if change comes through people there are more chances for success
SOL
meet with all stakeholders
SUB
resistance may arise-how to deal with it
SOL
have resources in place to help people
SOL
meet with superintendent to inform about change
FACT
refers to similar past experience

PRO: being proactive
ELA: elaborating/stating reason
SOL: stating solution
EVA: evaluating
FACT: stating examples from experience
SUB: stating subproblem

Figure 5
Problem 3: Budget Constraints
Principal C
Strategy: Solution Oriented


Problem Statement
ELA
Focuses on the issue of split classes and Elaborates
SOL
SOL
SOL
SOL
Meet with teachers to talk about split classes
Meet with parents about split classes
look at other options
work with school board for more funding
ELA
ELA
ELA
ELA
SOL: stating solution
ELA: elaborating/stating reaso

TYPES OF KNOWLEDGE

Research question 3:

What types of knowledge do principals use while problem solving?

Based on the integrated framework, three general categories of knowledge were expected in the data: knowledge of the organization, knowledge of the people, and knowledge of tasks. The analysis of the principals' protocols confirmed the presence of these general types of knowledge and revealed the existence of one new. Table 5 shows the different types of knowledge and their corresponding percentages, and Table 6 shows the four clusters of knowledge. A detailed description of each type follows.

Table 5

Types of Knowledge: Frequencies and Percentages Across Participants

Types of knowledge	f	%
External constraints	16	6.7
Internal constraints	21	8.9
Job complexity	8	3.3
Laws and regulations	27	11.2
Resources	13	5.4
Time	11	4.5
Completing interests	15	6.2
Knowledge of self	15	6.3
Strengths and weaknesses	6	2.5
Working with people	57	23.7
Roles and responsibilities	22	9.2
Experiential knowledge	29	12.1
Total	240	100

Table 6

Clusters of Knowledge: Frequencies and Percentages Across Participants

Clusters of knowledge	f	%
Knowledge of the organization	96	40
Knowledge of the people	93	38.7
Knowledge of the task	22	9.1
Experiential knowledge	29	12

KNOWLEDGE OF THE ORGANIZATION

The analysis of the principals' protocols showed that the principals identified six distinct subtypes under this type of knowledge: knowledge of external and internal constraints, of the complexity of the job, of the laws and regulations that govern the organization, of resources, and of time. This type of knowledge was the most frequently used by the principals during problem solving.

KNOWLEDGE OF EXTERNAL CONSTRAINTS

Statements in the principals' protocols that were coded as indicators of this type of knowledge reflected the principals' awareness of external constraints that restrict the range of their decisions within the organization. Such constraints relate to external factors such as community, unions, school boards, and other policies that affect the organization and limit the leader's role in decisions that affect the school. The following examples are illustrative of this:

> *I don't think that you can impose a philosophy amongst staff, students, and parents without feedback from them. This isn't the principal's school, it's a community school. (Marina, problem 2)*

> *I think ultimately you need to do what's best for your school and what's best for your class. And I know that one of the issues is, we don't always have full control over who we get in our school, and who teaches what. That's an awkward situation because if ultimately you could hire whoever you wanted, life would be great. But you can't do that because of unions, hiring factors, and all of those kinds of things. (Christine, problem 4)*

KNOWLEDGE OF INTERNAL CONSTRAINTS

Similar to external constraints, the principals identified other factors from within the organization that restrict their solutions to problems. These factors were labelled under the subcategory of internal constraints. Examples of this are in the following quotations:

> *Because if you want to be liked by everyone, you won't survive in the principalship. I mean, every parent isn't going to like you. Every kid isn't going to like you. Every teacher going to like you. That's just one of the realities of the job. (Wendy, problem 5)*

> *One of the rules that I live with is that I know that not everyone's going to agree with the final decision. But when we walk out of that meeting, we all live with the decision. (Paul, problem 3)*

> *As an administrator, you have to be able to put out some parameters as far as the decision-making concerns. It can't be wide open to the point where you say, "Well, we're going to get rid of the secretary. We don't need a school secretary." There are certain things that are touchables and certain things that are not untouchable. (Norm, problem 3)*

KNOWLEDGE OF THE COMPLEXITY OF THE JOB

Another type of knowledge that emerged from the protocols is the acknowledgement of the complexity of the principals' job. Principals referred to this with the following statements:

> *That really changes the role of the principal. More and more, we're doing things that aren't related to instructional leadership. I mean, we're an educational institution, and I deal with teaching and learning as my primary responsibility. But now we're faced with so many other things that there has been a bit of a shift, and I struggle on a daily basis in terms of trying to make sure that the balance isn't lost. I manage all the resources, yet I have to make sure that the school*

> *moves forward educationally. And it's complex, again, in terms of the role of the principal. (Wendy, problem 2)*

> *They aren't easy answers. And I guess if they were easy answers, then our job would be easy, but it's a complex job. (Marina, problem 5)*

KNOWLEDGE OF THE LAWS AND REGULATIONS

The principals referred explicitly to the underlying rules and regulations that govern a school. Statements in this category relate to issues such as teachers' roles and responsibilities, school board policies, and professional codes of behavior, among others. Illustrations of this subcategory are the following quotations:

> *The teacher is responsible for what goes on in the classroom, for designing, and for making sure that the program is implemented and evaluated with the student. A teaching assistant's role is to assist the teacher, so in a sense the teaching assistant really has to do what it is the teacher expects, and they work collaboratively. (Wendy, problem 1)*

> *Generally, principals decide themselves who teaches. The superintendent would decide how many teachers you would get, and what programs you run, but generally in our tradition, the principal actually makes the decision who teaches the class. (Keith, problem 4)*

> *We do have what's called administrative transfers, and if people are in a school and they're finding that it really isn't their philosophy, then they should be given the opportunity to leave. (Paul, problem 4)*

> *But the School Act very, very clearly says that if youngsters have special needs, the first option should be the neighborhood school. (Norm, problem 1)*

KNOWLEDGE OF RESOURCES

Knowing of what resources are available to help with teaching was another type of knowledge to which the principals referred during problem solving. Principals talked about resources that were accessible through the school system and those that the principals could provide for their schools. Examples of those are in the following quotations:

> *I would give her every opportunity for assistance, consultative assistance, assistance from the system as much as I could, assistance from myself, and any other support staff. (Sharon, problem 4)*

> *There are a number of sponsorships that could probably provide us with some support, but then again, proposal writing takes a lot of time. But we've got a number of options, looking at the Boys and Girls Club as support, mentorship programs, etc. (Marina, problem 3)*

> *Maybe distribute articles at staff meetings to read about inclusive education. Go on some visits to schools that do a lot of inclusive ed; let them see what it looks like; let them talk to other teachers. And then start asking what are their concerns, and addressing those through in-services and consultants. (Christine, problem 2)*

KNOWLEDGE OF TIME

Principals' awareness of the timing of events constitutes another subcategory of organizational knowledge. Statements concerning this are the following:

> *And as I said, that is not something you're going to do in a month, or a year, I'm looking at a five-year line. (Sharon, problem 2)*

> *If they say that next September we're going to have this model, and we're going to have a series of workshops December, January, February, March, April planning it, and even if it was a terrible model, at least we know what we're doing. (Keith, problem 2)*

> *The year before, say next year, we're going to start moving in this direction. (Christine, problem 2)*

KNOWLEDGE OF PEOPLE

Four subcategories emerged in the data that were classified under this type of knowledge: knowledge of competing interests, of self, of people's strengths and weaknesses, and of working with people.

KNOWLEDGE OF COMPETING INTERESTS

This subcategory refers to dealing with conflict and individuals with different interests. Principals stated in numerous occasions during problem solving how they would deal with such situations. Examples of that are in the following excerpts:

> *I very much believe in embracing negativity, going to negativity, going to the negative ones and saying, "I really want to understand more about where you're coming from." (Sharon, problem 2)*

> *If there are people who really aren't with you, you help them see that they're going to have to come on board with you, or you can help them find another location in the district that might fit better with their own beliefs. (Wendy, problem 2)*

> *You don't get everybody all the time, but I don't spend a lot of time with the people who are not helping; I spend more of my time and energy and attention with the people who are helping us. (Norm, problem 4)*

KNOWLEDGE OF SELF

Principals' awareness of self and their personal philosophies, belief systems, and values constitute this subcategory. Principals were explicit in statements that showed their positions in dealing with the problems. The following examples are indicative of this:

> *I have never shied away from making my opinions known to the superintendent or the associate superintendents. (Sharon, problem 5)*

> *And sometimes even in situations that are sticky and very uncomfortable and distasteful, that you still have to be honest. (Gerry, problem 4)*

> *If a teacher comes to me and says they're going to be resigning, and the reason for their resignation is the unclear and disorganized nature, I think that's really food for thought rather than to dismiss it altogether. One of the things that reflection helps me do is to look at whether I have really considered everything that one could possibly consider that might impact a particular situation. I find sometimes when I reflect I've either been a good listener, or I've spoken too much, or I've been too hasty in coming to resolution of a problem. It helps me grow when I reflect. (Wendy, problem 2)*

KNOWLEDGE OF PEOPLE'S STRENGTHS AND WEAKNESSES

Acknowledging the strengths that individuals bring to a specific situation constitutes this subcategory. Principals also acknowledged their own weaknesses and mistakes. Examples of this are in the following quotations:

> *We have a very valuable educational assistant in her. She has a lot of good skills. How could we best put her skills to use? (Sharon, problem 1)*

> *I would have to come and talk to the staff and say, "Look, I think I've made an error here." (Paul, problem 2)*

> *So if that was the case, I think that I would have to tell the staff that I messed up, and take the blame for that. (Christine, problem 2)*

KNOWLEDGE OF WORKING WITH PEOPLE

Statements in this subcategory were descriptive of the relationships between the principals and various groups, such as teachers, students, and parents. Evidence of that is in the following statements:

> *Helping kids develop some discipline, helping them develop some values and a set of beliefs that will serve them long term, so that when they are engaged in behaviors that are inappropriate for living together in a community, we have to help them understand what that does to not only their position within our learning community, but also in the larger community. (Wendy, problem 5)*

> *I think that any kind of positive that you can give to the staff, whether verbally, by e-mail, a little recognition, a treat in the mailbox, goes a long way. (Marina, problem 1)*

> *I believe that the very first thing, that there should be some type of trust relationship built up with the staff. I think it shouldn't be top down. (Paul, problem 2)*

KNOWLEDGE OF TASKS

Statements assigned to this category were descriptive of the specific roles and responsibilities principals assumed in their jobs. Statements of this sort are exemplified in quotations such as these:

> *I always work from a point of saying to teachers, "My role is to make you successful. Now you have a role to let me know what will make you successful so I can support you, so it's more a partnership." (Wendy, problem 4)*

> *My job would be to look after the whole school and the staff, and assign them to where they're best qualified and best able to teach. There are only so many things a school can do, and I would be responsible for those things that are part of our responsibility, but also pointing out the things that are not part of our responsibilities. (Keith, problem 3)*

EXPERIENTIAL KNOWLEDGE

One category of knowledge that was not present in the analytical framework is experiential knowledge. This category captures principals' references to experiences with problem solving. The principals referred to present or past experiences to support and/or justify a particular approach to problems. Statements that were coded under this category include the following:

> *I have had a personal experience with this, and I made it very clear to personnel that I may need assistance with this placement, and if that is the case, what could they do. So I had a commitment before I even met the teacher, and I made it very clear to the teacher what the situation was. It was very supportive. We gave her all kinds of supports. We put everything into place. (Sharon, problem 4)*

> *I've had people here who were identified as being in difficulty. My first meeting with the staff member was to say to be honest, to say to them, "You have been identified as someone who's experiencing some difficulty, but let's start here from saying we're going to get rid of whatever that difficulty is, and we're going to work together so that you're successful." (Wendy, problem 1)*

> *Yet, it's worked effectively in the past, so hopefully that would work. (Marina, problem 2)*

In these examples, Sharon, Wendy, and Marina used their past experience as proof of a successful outcome to a problem; whereas in the next example Paul used an example from the present to work out a solution to the problem:

> *However, one of the things that we do at the school is that we put our best teachers in the most difficult situations. The tougher the assignment, that's where you move your best people. So I would probably not put this person with the toughest class and the toughest assignment. (Paul, problem 4)*

VALUES

Research question 4:

What values do principals use while problem solving?

In service to this question, the data were examined once more with the program *Atlas.ti*. Principals were expected to refer to values during problem solving. Overall, 12 types of values were identified during the analysis of the protocols. These are the values of care, collaboration, confidentiality, consideration, effectiveness, fairness, integrity, mission, nurturing, personal values, professionalism, and transactional values. Table 7 summarises the incidence of references to each of these values in terms of percentages. A detailed description of each value follows.

Table 7

Percentages of Values Across Principals

Values	Percentages
Care	11.9
Collaboration	6.4
Confidentiality	2.7
Consideration	16.5
Effectiveness	3.6
Fairness	6.4
Integrity	4.6
Mission	27.1
Nurturing	3.2
Personal values	3.6
Professionalism	6.9
Transactional values	6.4

CARE

The care value includes comments that concern the physical, emotional, social, and psychological welfare of those who are involved in the educational enterprise. Concern for the physical welfare of teachers is evident in the following example:

> *One of the things that we [illegible]ainly promote is that the teachers take the time off when they need it so that they can get better. (James, problem 4)*

Wendy talked about the emotional and psychological well being of teachers in the following two passages:

> *Making sure that no one gets the feeling that they're not valued in the school. (Problem 1)*

> *I let the teachers vent sometimes. They just need to do that. (Problem 3)*

Finally, Marina talked about the social aspect of care concerning the students:

> *We need to ensure that we run a safe and caring school. And it goes beyond that: to ensure that we develop responsible citizens. (Problem 5)*

COLLABORATION

The value of collaboration concerns working with others to achieve common goals. Principals referred to this value with statements such as:

> *Certainly, I'd share my feelings in a constructive, collaborative way, versus some quick, top-down way. (Karen, problem 2)*

Wendy emphasised teamwork as part of the collaboration:

> *Because I feel very strongly that we need to work as a team, and all of us need to be able to work sort of collaboratively and co-operatively and have a shared vision for what our school is going to be. (Problem 2)*

In similar fashion, Paul talked about the value of collaboration through dialogue and reflection:

> *What we're doing here is, we're just asking questions, and through the questions people are questioning their own beliefs, and that's what is bringing about the change. (Problem 2)*

CONFIDENTIALITY

The value of confidentiality was evident in a small number of statements in the principals' protocols. The principals referred to this value only when dealing with problem 4, a personnel problem. The following are examples of this value:

> *I would also tell the staff that this is private. Ethically speaking, this is not something that I can discuss with them. (Sharon, problem 4)*

> *I would not share that with the staff. That's a personnel matter, and I just simply believe that personnel matters are not shared. I don't think it is anybody else's business to know how well or how poorly you are doing. That's something for the individual to share with their friends, not for me. It's confidential. (Gerry, problem 4)*

CONSIDERATION

The value of consideration includes concerns for having the complete picture, having pertinent information. The principals explicitly stated that they valued being informed personally about issues concerning the school. In addition, they stated that they valued others being similarly informed. An aspect of this value concerns the importance of taking the time to reflect. This value is illustrated in references in the following examples:

> *So listening is also a part, an important part of that, and letting parents talk about it, after you've provided them with some information. Allow them to digest it, but also to express their concerns, express their questions. And again, gathering information equips you to address those concerns in a knowledgeable fashion. (Karen, problem 3)*

> *I would listen to them very carefully, and I would react to their concerns. I would ask that teacher to meet with me, even if their decision was still to resign, to share with me the things that were of concern to them, share with me the things that they needed to be done to minimize those concerns. (Gerry, problem 2)*

Marina referred to the importance of reflection in the following passage:

> *I think there comes a point where we need to sit back and take some time to reflect, sharpen the saw, and take a look. (Problem 5)*

EFFECTIVENESS

The value of effectiveness concerns issues of efficiency and efficacy. The principals referred to this value when they had in mind what the effects of their actions would do to the people, teachers and students. Examples of this value are in the following:

> *The first priority would be to place her in a position that is most conducive to her gifts. Set both students and teacher up for success. I think that what's your prime focus is here. (Karen, problem 4)*

> *And what I try to get my staff to do is that when they have a little problem, let's talk about it, because before the little problem becomes big, we can talk about a solution that they're comfortable with. (Sharon, problem 1)*

FAIRNESS

This value refers to concern for honesty and procedural justice. Examples are in the following statements:

> *We do the best job we can, in terms of fairness. (Karen, problem 5)*

> *You are unhappy with someone's performance, you let [him or her] know quickly. I believe that creating an assignment that is difficult in order to force a teacher out is not fair game. I think it has to be above board all the way through. And sometimes, even in situations that are sticky and very uncomfortable and distasteful, you still have to be honest. (Gerry, problem 4)*

INTEGRITY

The principals also referred to the importance of integrity. Statements coded under this term reflect concerns for soundness, sincerity, and honesty. The following examples provide evidence of concern for integrity:

> *As a principal, you've got to be listening and incorporating their suggestions into your action plan in a very sincere way. You can't be providing them with lip service. (James, problem 2)*

> *I think the important part for me as a principal is that I do not side with the superintendent of the staff, but take what I would perceive to be above-board process, so that everything is treated with due respect, fairness, and due process. (Gerry, problem 4)*

MISSION

This value accounts for most of the principals' allusions to values. The term *mission* is used here in its broader sense; I use it to refer to the valuing of a strong and clear sense of direction and purpose. It includes strong overtones of valuing an orderly environment in the school, the broader school system, and the community, primarily by having people conforming to norms and organizational rules and regulations. For example, Gerry and Norm talked as follows about the importance of following the rules and regulations that govern the school:

> *Once we make a decision and we feel it's the right decision, we stand behind it. And if someone appeals it, overturns it, we abide by the rules. And I would be very direct with the staff about our role here: "You have a right to voice your opinion. You don't have a right to create a problem." (Gerry, problem 2)*

> *Once a principal or the school makes a decision to go in a certain direction, even if we don't agree with it, we have to support it and keep reminding people about that. (Norm, problem 2)*

This value is also reflected in statements about the importance of responsibility to the public and being true to the responsibilities with which educators have been entrusted by society and local communities. This point is emphasised in James's statement:

> *You've still got to try and satisfy the public because you are a service to the public. Part of what we're dealing with now in education is that we need to have some good public relations. (Problem 2)*

Similarly, Marina stated:

> *This isn't the principal's school, it's a community's school, and if we're looking at inclusive schooling, we need to include everyone in that process. (Problem 2)*

This value also includes concerns for having people "fitting into the larger picture." For example, Wendy stated:

> *My role is to make sure that I work with staff to understand that either you're going to come on board, if you're having trouble, let me know how I can help. But if you absolutely do not support what it is we're doing, then really they have an obligation to look for a position somewhere else. (Problem 2)*

Similarly, Christine stated:

> *I think ultimately the school and the kids and everybody are better off . . . if you have people on staff that [are] truly committed to the direction that the school is going. (Problem 2)*

Finally, the concern for adhering to the mission of the school leads to a readiness to accept mistakes and learn from them. An example of that is found in Karen's statement:

> *The principal must apologise profusely to her staff that I put the cart before the horse and that I didn't perceive the implementation as accurately as I need to have. And I wasn't aware that there were these problems. (Problem 2)*

NURTURING

Similar to the value of care is the value of nurturing, which includes concerns about direct or indirect influences that modify one's behaviour for the better. For example, Sharon and Wendy talked about the need to acknowledge the positives in students and help them develop values:

> *We need to look at honouring students for what they do well and helping students resolve the problems in a peaceful manner. (Problem 5)*

> *It's helping them develop some values and a set of beliefs that will serve them long term. So when they are engaged in behaviours that are inappropriate for living together in a community, we have to help them understand what that does to not only their position within our learning community, but also in the larger community. (Problem 5)*

PERSONAL VALUES

The principals referred also to a set of values that describe the individual's preferences regarding ways of operating in the school. Two representative examples of this value are in Wendy and Marina's statements:

> *The other thing is that I don't have a great need, personally, to be in the spotlight. I often tell staff here it's their success that really helps me be successful. That's my measure of success. If every student here and every staff member feels that they're successful, then I'm successful. So, I have no ideas of grandeur or anything like that. (Wendy, problem 3)*

> *I would have a real tough time enforcing that. I'm not an enforcer. (Marina, problem 2)*

PROFESSIONALISM

The principals referred also to professional values. Instances of reference to desirable professional behaviours are exemplified in the following:

> *I think they realize that we are here for the kids. Our primary responsibility is* to the students. *And when someone is unable to deal with kids, I have a responsibility as a principal to make sure that that is corrected, and to do it in a compassionate way.* (*Paul, problem 1)*

> *I think it's important for me as the principal to know every child in the school and to know them personally, and I don't mean just knowing their name. And when we get too big, then we can't do that. When we're too small, we don't have the resources to do some of the kinds of things we'd like to do.* (*Wendy, problem 3)*

> *You do have to show some leadership in doing that. I mean, if you expect people to be here half an hour before the bells goes, then you better be here half an hour before the bell goes. If you expect people to work a little later, then you better work a little later. (Norm, problem 5)*

TRANSACTIONAL VALUES

This set of values includes concerns about performing certain acts associated with constructive and corrective transactions. These transactions concern clarifying expectations and outcomes and monitoring irregularities and mistakes. Examples of transactional values are in the following quotations:

> *One of the things that are very harmful to the teaching profession is this word, unofficial reputation. It is extremely important that concerns be noted and documented according to policy and that documentation be taken and be carried out. (Sharon, problem 4)*

> *I always provide the individual with my expectation so that the person knows where I'm coming from. They are not expectations that I think are unrealistic, but they are expectations that I think every school principal should have. (Wendy, problem 1)*

> *I'll be gentle if needs be, but I'll also be very direct; that's what it's going to be. (Keith, problem 1)*

JUDGEMENT

Research question 5:

What evidence of judgement is there in principals' problem solving?

As foreshadowed in Chapter II, the search for evidence of judgement was complicated by three factors: (a) Mumford's definitions of judgement are ambiguous and sometimes contradictory, (b) there is little research to use as guidance, and (c) its location in the model is uncertain.

This phenomenon concerns the process of forming an opinion by discerning and comparing. On a few occasions the principals showed that they engaged in judging by explicitly stating estimates and evaluations of approaches and decisions made. Examples of this are in the following:

> *I think that the whole approach here is faulty, because, as it's presented here, I don't think it can work. (Wendy, problem 2)*

> *I don't think that it may have been something where she was consciously going to take over. I think it was probably more that she's involved in her own confidence such that she starts to have her own opinions about these things instead of doing it properly, which is to discuss it with the teacher. (Keith, problem 1)*

> *I just think that you are setting yourself up for resignations and lots of dissension on staff when you make the decision and just jump in with both feet. (Norm, problem 2)*

TYPES OF PROBLEMS

Research question 6:

Do principals use different problem-solving processes, strategies, types of knowledge, and values when solving different types of problems?

As indicated in Chapter III, the five cases used for the study were classified into two categories: human relations and strategic cases. In this section of the analysis, I compare the two types of problems in terms of the problem-solving skills (processes and strategies) they elicited, the types of knowledge that the principals used to solve them, and the values to which they referred.

PROBLEM-SOLVING PROCESSES

Table 8 compares the use of problem-solving processes in the two types of problems. In general, there are very few large differences: The principals seemed to use the same processes regardless of problem type. The only exceptions were in regard to three processes—representing problems, stating subproblems, and making assumptions—, which were used almost twice as much in the human relations problems.

Table 8

Problem-Solving Processes Across Problems

	Human relations problems (3 categories)		Strategic problems (2 categories)	
Problem-solving processes		Total		Total
	f	%	f	%
Representing problem	11	2.16	3	0.88
Stating sub-problem	28	5.51	10	2.95
Stating constraints	3	0.59	5	1.47
Stating solution	78	15.34	58	17.11
Evaluating	3	0.59	7	2.06
Summarizing	7	1.38	5	1.47
Elaborating/stating reasons	41	8.06	36	10.62
Presenting an alternative or hypothetical scenario	15	2.95	8	2.36
Making assumptions	16	3.15	6	1.77
Using metaphors/analogies	5	0.98	9	2.65
Stating facts from experience	27	5.31	27	7.96
Being proactive	9	1.77	3	0.88
Total	243	47.79	177	52.21

PROBLEM-SOLVING STRATEGIES

Table 9 shows that the principals used the strategies of conversion and decomposition only in human relations problems. Reversion was used more frequently in strategic problems. The solution-oriented strategy was used almost equally in both types of problems.

Table 9

Problem-Solving Strategies Across Problems

Problem-solving strategies	Human relations problems	Strategic problems
Conversion	5	0
Decomposition	5	0
Reversion	2	4
Solution oriented	18	16

TYPES OF KNOWLEDGE

Table 10 shows that the principals used four types of knowledge more often while solving human relations problems: experiential knowledge, knowledge of laws and regulations, working with people, and roles and responsibilities. In solving strategic problems the principals referred more frequently to experiential knowledge, time, competing interest, and working with people.

VALUES

Table 11 summarizes the pattern of references to values that were found in the protocols. First, the values that were referenced more frequently in human relations problems compared with strategic problems were care, fairness, and professionalism. It is interesting to note that three values were not referred to at all in the solving of strategic problems—confidentiality, fairness, and nurturing. Second, the values that were referenced more frequently when strategic problems were being solved were collaboration, consideration, and mission.

Table 10

Percentages of Types of Knowledge Across Problems

	Human relations problems (3 categories)		Strategic problems (2 categories)	
Types of Knowledge	f	Total %	f	Total %
Experiential knowledge	15	5.65	12	6.78
Constraints-external	9	3.39	6	3.39
Constraints-internal	4	1.51	10	5.65
Job complexity	4	1.51	9	5.08
Laws and regulations	25	9.42	2	1.13
Resources	4	1.51	9	5.08
Time	2	0.75	10	5.65
Competing interests	1	0.38	10	5.65
Self	4	1.51	3	1.69
Strengths and weaknesses	4	1.51	2	1.13
Working with people	23	8.66	26	14.69
Roles and responsibilities	19	7.16	2	1.13
Total	114	42.94	101	57.06

Table 11

Percentages of Values Across Problems

	Human relations problems (3 categories)		**Strategic problems** (2 categories)	
Values	f	Total %	f	Total %
Care	23	8.71	4	2.27
Collaboration	1	0.38	13	7.39
Confidentiality	6	2.27	0	0.00
Consideration	11	4.17	25	14.20
Effectiveness	6	2.27	2	1.14
Fairness	14	5.30	0	0.00
Integrity	6	2.27	4	2.27
Mission	29	10.98	30	17.05
Nurturing	7	2.65	0	0.00
Personal values	2	0.76	6	3.41
Professional	12	4.55	3	1.70
Transactional values	9	3.41	5	2.84
Total	126	47.73	92	52.27

LEADERSHIP STYLES

Research question 7:

What characteristics of transformational and/or transactional leadership are evident in principals' problem solving?

In this study an attempt was also made to discover whether each principal engaged in transformational and/or transactional leadership practices. To this end, the *MLQ - Rater Form* was administered to the teachers in the 10 principals' schools and the *MLQ - Leader Form* was administered to each principal. As noted in Chapter III, this questionnaire was used to portray the principals' leadership style quantitatively, as a complement to the qualitative descriptions extracted from the think-aloud protocols.

MLQ SCORES

The MLQ data show that the principals engaged in moderate to high levels of transformational leadership practices. Table 12 shows the average scores of the principals on each transformational dimension. Overall, these scores indicate that the principals engaged in transformational behaviours "fairly often" (an average score of 3.0).

Table 13 presents findings for the other dimension of leadership, transactional. These scores indicate that the principals "once in a while" (an average score of 1.2) engaged in transactional leadership practices. Finally, Table 14 presents the scores on the three leadership effectiveness scales.

Table 12

Mean Scores of the Transformational Leadership Dimensions

Transformational dimensions	Mean
Idealized attributes	2.6*
Idealized behaviour	3.1
Inspirational motivation	3.3
Intellectual stimulation	3.4
Individualized consideration	2.9
Total	**3.0**

Table 13

Mean Scores of the Transactional Leadership Dimensions

Transactional dimensions	Mean
Contingent reward	2.5
Management by exception-active	1.2
Management by exception-passive	0.9
Total score	**1.2**

Table 14

Mean Scores of Leadership Effectiveness Scales

Leadership effectiveness	**Mean**
Extra effort	2.9
Effectiveness	3.1
Satisfaction	3.1
Total score	**3.0**

*Rating scale: 0=not at all, 1=once in a while, 2=sometimes, 3=fairly often, 4= frequently, if not always.

EVIDENCE OF TRANSFORMATIONAL AND TRANSACTIONAL DIMENSIONS OF LEADERSHIP

Statements from the principals' protocols appear to support the results of the questionnaire and imply that the principals referred to transformational behaviours during problem solving associated with individual consideration, intellectual stimulation, inspirational motivation, and idealized behaviour. According to Bass (1990), the transformational dimension of individual consideration includes the leader treating others as individuals rather than just as members of the group, considering the different needs, abilities, and aspirations, helping others to develop their strengths, and listening attentively to others' concerns. The following excerpts are evidence of that:

> *She is to be congratulated; . . . she worked hard to become a teacher. (Sharon, problem 3)*

> *We have a very valuable educational assistant here. She has a lot of good skills. How could we best put her skills in use? (Wendy, problem 3)*

> *The most important thing in administration is to be willing to listen and learn. (Marina, problem 4)*

Another dimension of transformational leadership is intellectual stimulation, which refers to getting others to look at problems from different angles, stimulating ideas and creative solutions, and encouraging new ways of looking at situations. Examples of those behaviours are exemplified in the following excerpts:

> *I ask teachers to do a self-reflection, critical analysis of their own performance. And for me, I always work from the point of saying to teachers, "My role is to make you successful. Now you have a role to let me know what will make you successful so that I can support you." (Sharon, problem 4)*

> *I think it's about time that the principal sat down with the staff and said, "We have these problems; this is how we are currently dealing with it. What are the good things about it? What are the negative things about it?" And analyze it. (Wendy, problem 2)*

> *I think it's not what we see, but how we see it, and the approach that we take in looking at problems; . . . we need to look at problems as gifts. (Marina, problem 3)*

There was also evidence of inspirational motivation. Leaders inspire followers by instituting symbols and by referring to vision statements that bring team alignment and collaboration together to justify actions. The principals in this study showed evidence of this leadership dimension with statements that referred to helping staff develop and maintain a collaborative and professional school culture. The following passages are examples of this:

> *The people within the organization need to be very much part of the decision-making [process]. (Gerry, problem 3)*

> *I feel very strongly that we need to work as a team and all of us need to work collaboratively and co-operatively and have a shared vision for what our school is going to be. (Paul, problem 2)*

> *I think we all have things that we could share. And if we can be more collaborative and open, it works much better. (Christine, problem 3)*

> *It would be imperative the lines of communication to be open and that they dialogue regarding concerns, or questions, or issues that may arise. (Marina, problem 1)*

The principals also referred to transactional leadership behaviours. Such behaviours are associated with constructive and corrective transactions that deal with monitoring teachers' performance, clarify roles and expectations, and correct mistakes (Bass & Avolio, 1998). Evidence of such behaviours were found in the following statements:

> *There would be a lot of disciplinary action on both parts. I think that you can't do things like this. (Paul, problem 1)*

> *Emily disobeyed a direct instruction from her immediate supervisor, and she was wrong in doing that. So I would tell her that. (Norm, problem 1)*

> *I made clear to the staff that we were going to accommodate youngsters with special needs. We talked about it and we accommodated [them] in regular classes. They all accepted them. (James, problem 2)*

> *As a matter of law, Emily's wrong. There's no question about that. And if I could tell her gently and she didn't see that, then I would tell her less gently, and we'd probably pulling out the collective agreement or whatever documents say so. (Keith, problem 1)*

Transformational and transactional leadership behaviours are considered dimensions of effective leadership. Overall, the principals showed evidence of both styles of leadership in their problem solving, with more emphasis on transformational behaviours than transactional behaviours. Transformational behaviours were associated with practices such as encouraging a collaborative and supportive school culture; acknowledging and attending to individual needs, feelings, and concerns; and engaging staff in teamwork.

CHAPTER V

DISCUSSION, IMPLICATIONS, AND CONCLUSIONS

In this chapter I discuss my findings in relation to existing knowledge and understandings about problem solving; in particular, problem-solving skills (processes and strategies), judgement, types of knowledge, values, approaches used with different types of problems, and leadership styles. Accordingly, I first review the findings in light of the existing literature and the integrated framework presented in Chapter II. Then I examine the implications of these findings for the theory and practice of educational leadership. Finally, I conclude with a statement about the use of cognitive approaches to educational leadership. As noted earlier in Chapter II, some use is made here of literature that was not reviewed previously but whose pertinence became evident only after the data were analyzed.

DISCUSSION

Overall, my findings support the problem-solving skills (processes and strategies) of the integrated model I presented in Chapter II. Thus the first expectation listed in the conclusion to the literature review was supported by the data of my study:

- Principals use some or all of the problem-solving processes featured in the integrated model and described in details in the literature.

The integrated model drew from three prominent problem-solving models, Leithwood and Jantzi's (1990), Voss et al.'s (1983), and Mumford et al.'s (2000). A detailed discussion follows.

PROBLEM-SOLVING PROCESSES

The principals who participated in this investigation used 12 processes during problem solving: representing the problem, stating subproblems, stating constraints, stating solutions, presenting an alternative or hypothetical scenario, making assumptions, using metaphors, elaborating/stating reasons, summarizing, stating facts from experience, evaluating, and being proactive. These processes are similar to those found by both

Leithwood and Jantzi (1990) and Voss et al. (1983). Furthermore, these processes clustered into three general categories: problem construction, plan formation and execution, and regulation. As presented in the following sections, these categories correspond to Mumford et al.'s (2000) model of problem solving: understanding the problem, gathering information, formulating a plan, implementing the plan, and evaluating the plan.

PROBLEM CONSTRUCTION

This cluster of processes corresponds to Mumford et al.'s (2000) category of understanding the problem. In this study I found that the principals constructed the problem in two ways—by explicitly stating how they understood the problem and by identifying its parameters, subproblems, and constraints. The problem-solving literature has identified problem representation as a critical element in solving problems and has suggested that the quality of the solution depends on how well the problem has been represented (Frederiksen, 1990). However, the principals in this study engaged in explicit problem representing in very few instances. It seemed that they did not need to state explicitly what the problem was, and the research literature on experts' problem solving reports similar findings. In particular, previous studies have found that experts do not need to develop problem representations when they already have a solution in mind because of a previous encounter with a similar problem (Voss et al., 1983).

Another point worth mentioning in connection with this first cluster of processes is that the principals referred to subproblems more often than the process of representing the problem. In fact, all 10 principals identified subproblems during problem solving. Although this element was generally not emphasized in the problem-solving literature, Voss et al. (1983) found (as I did) that this process accounts for a large portion of problem-solving activity. By way of explanation, it seems reasonable to assume that these principals were familiar with problems similar to the ones that they were asked to solve and instead of stating explicitly how they understood them, they moved immediately to identifying smaller problems for which they could provide solutions.

PLAN FORMATION AND EXECUTION

The second class of processes covers another three categories in Mumford et al.'s (2000) model: gathering information, formulating a plan, and implementing the plan. My findings suggest that the principals used the parallel processes of stating solutions, presenting alternative or hypothetical scenarios, making assumptions, using metaphors, elaborating/stating reasons, summarizing, and stating facts from experience to formulate a plan for solving the problem.

Three points are worth mentioning related to this category of processes. First, the principals devoted a great deal of their solving activity to identifying solutions to the problems they were solving. In some cases, the principals' protocols were dominated by the solution process. Although this is perhaps to be expected, it is nonetheless interesting to note the extensive amount of the principals' thinking devoted to this aspect of problem solving. Second, another interesting finding is that this process was frequently followed by argumentation and reasoning in support of a chosen solution, with such statements referring often to the ramifications of the proposed solutions. Previous research has suggested that this aspect of the solution process is indicative of expertise (Leithwood, 1989, 1993; Voss et al., 1983).

This research has suggested that principals use the reasoning process during problem solving to explore the ramifications of their proposed solutions and to provide supportive argumentation (Voss et al., 1983, p. 193). Third, the principals frequently used examples from their present and/or past experiences to explain and illustrate their proposed solutions. Research in both educational and noneducational contexts has reported the use of this process during problem solving. In addition, Leithwood (1993) found this with expert principals.

REGULATION

Regarding the last cluster of processes, the principals used two ways to monitor and evaluate their problem solving: by providing explicit evaluations of their proposed solutions and by referring to proactive steps that they would take to deal with issues before they grew into problems. Although the process of evaluation was reported frequently in the problem-solving literature, there was no evidence of the process of being proactive. An explanation for the use of this process may lie within the nature of problems. In my data, it appears that certain problems elicited this process more than others. For example, in case 2 the principals used this process more frequently than in the rest of the problems. Further research with different kinds of problems is needed to verify this finding.

Although the three-step model that was derived from the data may suggest a *sequence* in problem solving, it should be noted that this linearity and sequencing was not evident in the protocols of the principals who participated in my study. These principals used different combinations of processes to solve the problems, with variations evident even within the same individual's protocols across problems. For example, it was found that not all processes were present at all times during problem solving. Furthermore, more often than not, the principals used one set of processes to solve one problem and others to solve the others. This point is made clearer in the next section, where I discuss the problem-solving strategies.

From a cognitive perspective, one could assume that problem solving follows a linear model, wherein one has to identify what the problem is, what information is required to solve it, what plans are the most suitable for solving it, and how to evaluate the outcome of one's solutions. Such linearity has been supported in the literature about the solving of science problems where, typically, the problem is given, the information needed to solve it is provided, and the plans for execution are well defined. However, when dealing with real-life problems, the process is not the same.

One reason is that real-life problems—including social, educational, political, and economic problems—are more complex and dynamic than science problems, so that a linear model is not adequate for describing how people go about solving such problems. Another reason is the complexity of human cognition, which allows for a great variety of responses to problems. Cognitive psychology research offers a further explanation. According to cognitive psychologists, humans give meaning to situations through the prism of selective attention, a process that is influenced by their thoughts, memory incidents, expectations, levels of stress, and a system of values. Because of these variables, individuals experience things differently and, as a result, process problems by paying attention to different stimuli (Schott, 2001).

Gardner (1987), too, has argued that the best way to understand the kind of reasoning that people generally employ is to ignore formal logic and focus on *content* and *form*. He further stated that people seem to be able to solve a problem better when they are familiar with its components and when they have rich schemata for analyzing the problem. Gardner further argued that the rational model is not adequate for describing the complexity of human cognition because

> *[humans] have evolved as creatures who are most likely to succeed on tasks that contain familiar elements and allow the ready construction and manipulation of mental models. Consideration of pure logic, a field that developed long after our survival mechanisms had fallen into place, may be useful for certain kinds of information under certain circumstances by certain individuals. But logic cannot serve as a valid model of how most individuals solve most problems most of the time. (p. 370)*

PROBLEM-SOLVING STRATEGIES

Examining problem-solving processes would be of limited significance if one were not to examine how these processes are organized into strategies. Nonetheless, the issue of problem-solving strategies has received scant attention in the problem-solving literature. The bulk of studies on problem solving tends to focus almost exclusively on the identification of processes and fails to attend to strategies. Furthermore, when this term is used in the literature, it carries different connotations, depending on the researcher and the nature of the study. For the purposes of this study, I separated strategies and processes. Thus, a problem-solving strategy is a *set* of discrete processes that are organized into a coherent and abstract whole and constitute an approach to problem solving. Only Voss et al. (1983) have used the term *strategy* in the way that I defined it in this study.

Analysis of my data showed that the principals used four strategies to solve the problems. I have called them conversion, decomposition, reversion, and solution oriented. The first two strategies are similar to the ones that Voss et al. (1983) found in their study. The last two did not occur in the literature to date and presents new findings. Thus, the second expectation listed at the end of the literature review was supported but not entirely adequate:

- Principals use the following three problem-solving strategies: decomposition, conversion, and neutralizing factors that contribute to problem.

Further research is needed to verify these findings and, perhaps, to expand the present list with more strategies.

Two points are worth mentioning about the use of strategies as they appeared in the principals' protocols. First, no one *set* of processes is associated with any one of the strategies. Instead, a single process seemed to appear consistently in the same strategy across problems and participants. For example, in "conversion" the process that appeared consistently was representing the problem, in "decomposition" the process was stating subproblems, in "reversion" the process was being proactive, and in "solution oriented" the process was stating solutions. In this last strategy, this process dominated the protocols almost exclusively. Due to lack of supporting or contradictory evidence in the literature, these findings must remain tentative for now. Voss et al. (1983) did not link certain processes with specific strategies. From a cognitive psychology point of view, this presents an opportunity for further investigations.

Second, the fact that problem-solving strategies cannot be descriptive of a consistent set of problem-solving processes points again to the nonlinearity of problem solving. One theory that can explain this phenomenon is schema theory.

SCHEMA THEORY

Schema theory is one of the most interesting theories within cognitive psychology for explaining how people organize and process information. Schemata are scripts, models, or "cognitive maps" that we carry in memory, and they provide a ready-made context in which to place information flowing through the senses (Schott, 2001). As Rummelhart (1980) put it, "A schema contains the network of interrelations that is believed to normally hold among the constituents of the concept in question. A schema theory embodies a prototype theory of meaning" (p. 34).

Schemata organize and guide our reactions to events by bringing patterns of past experience that are stored in memory to bear on current information. Schemata have much to do with where attention is focused and are modified and redefined as part of the maturation process and exposure to the world. Thus, schemata are characterized by a relative plasticity. This, together with selective attention to stimuli, seems to account for the variability of the use of processes and strategies during problem solving.

Although this study was not designed to examine the stimuli that captured the principals' attention, it seems reasonable to speculate that different schemas were activated for each of the principals and that this elicited the use of different processes. One mediating factor is memory: Memory is an important factor in the screening and filtering of information. The fact that the principals referred extensively to incidents from their past experiences to justify their proposed plans of action is indicative of the role that memory played in their problem solving.

From the discussion thus far, it seems reasonable to conclude that the problem solving of this group of principals was characterized by complex and dynamic interactions among a host of variables that played significant roles in determining the particular courses of action that each principal adopted to solve the problems. If complexity and nonlinearity are characteristics of problem solving, we may need to go outside the realm of conventional psychology to look for answers, possibly in chaos and complexity theories.

TYPES OF KNOWLEDGE

The quality of principals' knowledge is related strongly to effectiveness in problem solving and decision-making. Research on the knowledge structures of leaders has indicated that leaders rely heavily on knowledge representations in order to identify key elements and information sources to solve a problem. Leithwood et al. (1993), studying educational leaders, conceived of knowledge as a value, whereas Mumford et al.'s (2000) more recent studies in military contexts have depicted knowledge as a skill. The findings of my study are aligned more with Mumford et al.'s studies. Specifically, I found that the principals in this study referred to 12 distinct types of knowledge during problem solving and that these types could be further classified into three categories: knowledge of the organization, people, and tasks. This classification scheme is similar to Mumford et al.'s typology of knowledge. However, Mumford et al. did not identify the specific types of knowledge that comprise each category. Thus, the fourth expectation prompted by the literature review and listed at the end of Chapter II was supported by my findings:

- Principals use three types of knowledge during problem solving: knowledge of the tasks at hands, knowledge of the people with whom they work, and knowledge of the organization.

In this study, moreover, I found that the principals referred to organizational knowledge more often than the other types. As presented in Chapter IV, the principals referred to six specific types of organizational knowledge: of external constraints, of internal constraints, of the complexity of the job, of relevant laws and regulations, of resources, and of time. Among those, two types received the most attention—knowledge of laws and regulations and knowledge of internal constraints. What can be inferred from these results is that knowing about and being able to refer to regulations and general rules were high in these principals' priorities. Also, the awareness that they function within constraints imposed from outside as well as coming from inside the organization was another important variable in the principals' knowledge structure. Interestingly, the principals paid more attention to dealing with constraints that exist within the structure of the organization and less to those imposed from outside the organization, such as school board decisions and policy implementations.

The next most frequently used class of knowledge was knowledge of people (knowledge of competing interests, of self, of one's strengths and weaknesses, and of working with people). Knowledge of working with people received the most attention. Although I am not aware of other empirical evidence to support this finding, it does point to a central element of educational leadership and a principal's job: the people who are involved in the educational process—including students, parents, communities, boards of education, and other groups of stakeholders.

The last category of knowledge is knowledge of tasks. As reported in Chapter V, one type of knowledge was found to be most prevalent—knowledge of roles and responsibilities—with the principals talking about the roles and responsibilities of teachers and teaching assistants, the role of students, and even their role as principals and educational leaders. In similar fashion, Leithwood et al. (1993) reported similar findings about the importance of this type of knowledge. Leithwood et al., however, presented this component as a value instead of treating it as significant knowledge that leaders should have.

In addition to these three previously identified clusters of knowledge, I found a new category in my data: experiential knowledge. This type of knowledge is associated with representations of incidents from past experience. As presented earlier, the principals drew on examples from their past experiences to support or justify a proposed solution. Research has found that the experience-based representations of facts influence how leaders define problems, evaluate restrictions, and implement plans. More specifically, in a series of studies by Sternberg and Wagner (1993) and Wagner and Sternberg (1985), it was found that experience-based knowledge may influence leaders' performance on complex tasks. These two roles of experiential knowledge in leaders' performance (justifying and motivating) present an interesting focus for further studies.

VALUES

Mumford et al. (1993) have posited that when leaders are presented with and then asked to solve complex, ill-defined problems, the goals and structure they impose on their problem solving are not purely functional. Broader life themes and enduring beliefs influence how they construct the problem, its implications on the organization, and others' reactions. Thus, examining the values that leaders bring into the job becomes of utmost importance. Another reason for examining values is their changing nature. Values change over time as social systems and organizations that are part of them evolve and constantly redefine their directions (Green, 2001). In studies of organizational behaviour, values are important because they have been linked not only to conflict, communication, goal setting, and control, but also to organizational performance (Dose, 1997).

As reported in Chapter IV, the principals in this study referred to 12 values during problem solving (care, collaboration, confidentiality, consideration, effectiveness, fairness, integrity, mission, nurturing, personal values, professionalism, and transactional values). Thus, the fifth expectation left by the literature review (see end of Chapter II) was supported by my findings:

- Principals refer to values when solving problems.

Of the 12 discrete values, principals referred most frequently (in descending order) to three: mission, consideration, and care.

Mission refers to having a compelling vision, shared goals, and purposes; establishing open and candid communication with people; and ensuring an orderly and safe environment. The majority of these values have been identified in the literature as moral values. For example, Day, Harris, and Hadfield (2001) found that the leadership actions of principals were based primarily on moral values; that is, they were dedicated to the welfare of staff and students, with the latter at the centre. Such values are care, fairness, and honesty. In addition to moral values, the principals referred to values associated with organizational effectiveness—the values of mission, effectiveness, and professionalism. Furthermore, the principals used transactional values to monitor performance and correct mistakes. Last, the category of personal values was associated with characteristics in self that were seen as desirable.

As noted in Chapter II, the literature is replete with studies that have investigated the values that leaders espouse in organizational settings. Further research is needed, however, to examine how these values influence leaders' performance.

JUDGEMENT

An interesting aspect of the principals' problem-solving activities concerns their use of judgement, which I treated as a separate construct in the integrated framework. *Judgement* is described as "the action of mentally apprehending the relation between two objects of thought" (*Oxford English Dictionary*, 2002). Other terms that are associated with judgement are wisdom, discernment, and good sense.

Evidence from the principals' problem solving suggested that they used judgement in very few instances to support decisions they made at various stages. My findings concerning the use of judgement suggest that it might be better conceived as a cognitive *skill*, but its role in problem solving has yet to be clarified. Judgement has hardly appeared in the problem-solving literature. The one exception I encountered was in Mumford et al.'s (2000, 2001) studies. As noted in Chapter II, Mumford and his colleagues defined judgement as a *social* skill, and wrote about it as "social judgement" or "social intelligence." Although these researchers suggested that judgement is a key leadership competency, particularly when complex and uncertain social conditions existed, they treated it as a social skill, and they failed to perceive it as a potentially critical element in problem solving. To this point, there is no research on the influence of judgement as a cognitive element in problem solving. The few instances where it was evident in my data were not enough to draw any conclusions about its significance. Thus, the third expectation prompted by the literature and listed at the end of the literature review was supported only very tenuously:

- Principals use judgement when solving problems.

More research is needed to shed light on this component and demystify its role in cognitive processing.

TYPES OF PROBLEMS

The problem-solving skills (processes and strategies), types of knowledge, and values were used to compare two types of problems: human relations and strategic. The two types of problems have been defined as ill structured in the problem-solving literature (Cowan, 1991) and they represent two organizational dimensions: (a) an orientation dimension that includes human relations problems, and (b) an organizational-level dimension that includes strategic problems (Cowan, 1991). The five problems used in this study were classified using this classification scheme. Thus, three problems represented the human relations category and two problems the strategic category. It is acknowledged, however, that social science problems are not pure types. However, depending on the variables described, problems may contain more elements of one type over the other.

Whether principals used different problem-solving skills, types of knowledge, and values when dealing with different kinds of problems is an important issue. Prior research on the problem-formulation stage of the decision-making process has shown that leaders respond idiosyncratically to problem stimuli; and, consequently, they solve problems in different ways (Cowan, 1991; Mintzberg et al., 1976). Furthermore, leaders have provided unique descriptions of processes that accompany different categories of problems (Cowan, 1988; Lyles, 1987). My data tend to provide support for these findings. Thus the sixth expectation led by my review of the literature (see end of Chapter II) was supported by my findings:

- Principals use different processes and strategies, types of knowledge, and values when dealing with strategic as opposed to human relations problems.

PROBLEM-SOLVING PROCESSES AND STRATEGIES ACROSS PROBLEMS

I found no major differences in the problem-solving processes that the principals used to solve the two types of problems. However, two putative variations warrant comment.

The first ephemeral variation occurred in the domain of *human relations* problems, in that the principals made almost twice as much use of the processes representing the problem, stating subproblems, and making assumptions. There has been little prior research to help explain this phenomenon. However, I speculate that, given the complexity and ambiguity of human relations problems, the principals were being extra careful in constructing the human relations problems accurately—especially by devoting more attention to stating how they understood the problem, by identifying its parameters (subproblems), and in making assumptions to compensate for missing or incomplete information.

The second ephemeral variation involved the two *strategic problems*. My data showed that the strategies of conversion and decomposition were not used at all in strategic problems, whereas the strategy of reversion was used twice as much in these problems compared with human relations problems. Given the "thinness" of the evidence here, further studies are recommended to determine the validity of these findings. In the meantime, I can offer tentative explanations for these possible differences. Because strategic problems are more task oriented and have to do with aligning the organization's purposes, objectives, and goals to the exigencies of the environment, the principals may not have been thinking in terms of breaking down the problem or converting the problem into another issue. Instead, they may have been focusing almost exclusively on solving the problem holistically as given. Another explanation for these differences may be in the wording of the problems. It is possible that the wording of the problem predisposed the principals to reverse the course of action in order to solve it.

TYPES OF KNOWLEDGE ACROSS PROBLEMS

As reported in Chapter V, some differences were found in the types of knowledge that were used across problems. One difference that is worth commenting on is that in the first category (human relation problems) the principals referred more frequently to the knowledge of laws and regulations and the knowledge of working with people, whereas in the second category (strategic problems) the principals referred more frequently to the knowledge of working with people. Again, in the absence of other research, these findings must remain tentative at this point, but a possible explanation for these variations may lie in the nature of the problems.

As discussed earlier, the complexity and the dynamic nature of human relations problems could have prompted the principals to rely on the general principles that are inherent in rules, regulations, and formal role specifications. This possibility is reinforced by the finding that the principals paid close attention to making sure that individuals understood what was expected of them in terms of the regulations that governed their jobs, and to informing themselves of the laws and policies in the system that they could use when needed.

In contrast, when they were solving strategic problems, the principals referred more frequently to the knowledge of time and to competing interests. The explanation here may also lie in the nature of these problems. Because strategic problems emphasize task accomplishment and operational aspects of the organization, it would be natural for the principals to refer to knowledge of pragmatics. Managing time is an important component in the effective and efficient operation of a task-oriented situation; and dealing with individuals' competing interests ensures the viability of the organization as a whole.

VALUES ACROSS PROBLEMS

Although all values that were evident in my data were referenced in both types of problems, there were differences across the problem types that are worth commenting on.

As reported in Chapter IV, the principals referred to five values more frequently in human relations problems (care, consideration, fairness, mission, and professionalism); and when they were solving strategic problems, they did not refer to confidentiality, fairness, or nurturing. Again, the explanation may be in the characteristics of the problems. The values of confidentiality, fairness, and nurturing are moral values, so they are more likely to be at issue in situations that deal with human problems as opposed to task-oriented problems. This is consistent with what I found in connection with strategic problems, where the principals put more emphasis on collaboration and consideration. In dealing with the strategic problems, the principals would appeal to the values of collaboration and consideration to align individuals in the organization with the goals and purposes of the organization—to affect broader organizational visions and objectives. Of necessity, the requisite negotiations must be grounded in consideration of others' needs, feelings, and values as well as a commitment to employing others' goals. Lack of empirical evidence to support these findings suggests that future studies could examine in more detail these differences.

LEADERSHIP STYLES

Theories of transformational leadership provide important insights about the nature of effective leadership. Unlike traditional leadership theories, which emphasized rational processes, theories of transformational leadership emphasize emotions and values. These theories also acknowledge the importance of symbolic behaviour and the role of the leader in making events meaningful for followers (Shamir, 1999). These theories also help us understand how a leader can influence followers to make personal sacrifices, commit to objectives, and achieve more than was initially expected. Thus, transformational leadership differs from transactional leadership insofar as the latter involves an exchange of benefits, with an aim to motivate follower compliance with leader requests and organizational rules.

One of the conceptualizations of transformation leadership that has received much attention in recent year is Bass's (1990) theory. Bass was concerned with identifying the behaviours that underlie instances of exceptional leader performance. To do that, Bass devised a behavioral description inventory, the *Multifactor Leadership Questionnaire* (MLQ), which led to the identification of factors such as idealized influence, inspirational motivation, intellectual stimulation, individualized consideration, management by exception, and contingent reward.

One of the objectives of my study was to investigate whether any of the above leadership behaviours were evident in principals' problem solving. To this end, the principals and their teachers completed appropriate versions of the *Multifactor Leadership Questionnaire* (MLQ), which allowed me to identify the principals' preferred leadership style, and the protocols were examined for evidence of leadership behaviours that could be characterized as transformational and/or transactional.

In general, my findings are congruent with earlier findings. As reported in more detail in Chapter IV, I found that the principals engaged in transformational leadership behaviours more frequently.

Furthermore, I found that the principals were perceived by their staff to be effective "fairly often." My finding concerning the relation between transformational behaviours and effectiveness is consistent with what has been reported in the literature, where there was considerable evidence that transformational leadership behaviours are positively related to such indicators of leadership effectiveness as subordinates' satisfaction, motivation, and performance. For example, in a meta-analytical review of 39 studies that had used the MLQ, Lowe, Kroeck, and Sivasubramaniam (1996) found that key elements of transformational leadership correlated positively with subordinates' satisfaction and performance.

As to whether transformational leadership behaviours were evident in principals' problem solving, my findings provide support for previous understandings and some interesting insights. As indicated earlier, I found that the principals alluded more often to the transformational leadership behaviours that relate to individual consideration, intellectual stimulation, and inspirational motivational. By way of reminder, the following reflect some of what was reported earlier:

- Evidence of individual consideration included incidents of being friendly, considerate, and appreciative of others.
- Evidence of intellectual stimulation behaviours included statements indicating that principals guided their teachers to question traditional beliefs, to look at problems in a different way, and to find innovative solutions to problems. Interestingly, the principals scored higher in this dimension of transformational leadership as the MLQ scores showed.
- Evidence of inspirational motivation included statements that were related to articulating a vision for the organization and promoting a collaborative and professional school culture.

One of the criticisms of the transformational leadership construct is that there is uncertainty about what leaders actually say or do to influence the cognitive processes or behaviours of subordinates (Shamir, 1999). For example, what does the leader do to encourage creative problem solving? The data of my study suggest that the principals engaged "stimulating" behaviours when they referred to reflection, brainstorming, and perceiving problems as learning opportunities. More studies to investigate further the relationship between intellectual stimulation and creative problem solving would serve to still criticisms such as Shamir's.

My data also indicated that the principals engaged in transactional behaviours, although to a lesser degree. This is consistent with Bass's (1990) contention that effective leaders display transformational *and* transactional leadership behaviours. Among the three transactional behaviours that the MLQ measures (contingent reward, management by exception—active, and management by exception—passive), the first dimension is worth mentioning. The principals in the present study used this dimension of leadership in a much broader sense. Apart from providing corrective and constructive feedback and monitoring teachers' performance, they also engaged in task-oriented behaviours. They did so by clarifying roles and expectations, setting specific task goals and monitoring the achievement of these goals, planning, coordinating activities, and allocating resources.

These behaviours, although not measured in the MLQ, have been reported in the literature as elements of effective leadership (Den Hartog, 1997; Podsakoff, MacKenzie, Moorman, & Fetter, 1990; Yukl, 1997).

In general, then, my findings support the seventh and final expectation generated by my review of the literature:

- Principals during problem solving refer to leadership behaviours associated with a transformational and/or transactional style of leading.

To conclude the discussion about leadership styles, it should be noted that Bass (1990) has maintained that transformational leadership is beneficial for all followers and in all organizations, regardless of the situation. Several theorists, however, have proposed that certain situational variables may increase the likelihood of transformational leadership being engaged in, and that certain situational variables moderate its effects on followers (Pawar & Eastman, 1997; Podsakoff, MacKenzie, & Bommer, 1996) Whether this is so in educational organizations is moot. In the educational sphere, few studies have used Bass's model of transformational leadership (Barnett, McCormick, & Conners, 2001; Stone, 1997). The results of these studies have generally supported Bass's model in that both transformational and transactional leadership behaviours were identified in educational leaders. However, these studies have also indicated that there are definitional issues and that further research is needed to clarify what differentiates transformational leadership from transactional leadership. Furthermore, additional research is also needed to clarify the relationships between transformational and transactional leadership on the one hand and school cultures in varying contexts on the other.

The results of this study generally support Bass's (1990) model of transformational and transactional leadership, but it did not examine other variables that may have effects on the quality of leadership that was exercised. Rather than relying so much on questionnaires, future studies in educational settings should include qualitative measures of leader behaviour and should take into account mediating variables, outcome variables, and situational variables.

IMPLICATIONS

The implications of the present study are threefold: It supports cognition-focused approaches to augmenting understandings about effective school leadership, adds to the knowledge base of effective school leadership, and contributes to the development of effective leaders. The first two implications concern theory and future research; the third concerns practice.

IMPLICATIONS FOR THEORY AND RESEARCH

AUGMENTING UNDERSTANDINGS ABOUT SCHOOL LEADERSHIP

Perhaps the most important contribution of this study to theory is that it supports the cognitive approach to expanding understandings about the bases of administrative behaviour. A first observation concerns the reality of organizational life. As discussed earlier, individual leaders give meaning to organizational events by focusing their attention selectively on issues that they consider important. This process is influenced by a host of variables, such as values, knowledge structures, emotions, and personal beliefs. Seen in this perspective, organizational life is mainly phenomenological, with its various members experiencing different patterns of reality. In this connection, Culbert and McDonough (1985) provided an interesting analysis of organizational reality, suggesting that most members live in two realities:

> *[The] first is the reality of the individual, what he or she truly believes exist. The second is the operating reality of the organization, which we call the dominant reality. Each of these realities produces its own world than can differ significantly depending on the individual and the circumstances. (p. 96)*

This dominant reality, they argued, is the context within which the individual is bound to the organization. Because members bring various meanings to organizational events, an important task of the leader is to help provide a context or common interpretation for organizational life. In order to do that, a leader would have to try to understand an individual's perceptions as well as his or her perceptions of others. Thus, an awareness of the phenomenological aspects of the organizational life is considered essential for effective leadership.

This study provides an exploration of one aspect of that reality, the leaders' reality. By studying the problem-solving skills of school leaders, we acquire better insights into what goes on in their minds before they make decisions. Future studies can focus on the realities of other constituencies and how these realities are negotiated to lead to more competent and effective organizations. One of the characteristics of the cognitive approaches to the study of leadership is its assumption that competent leaders are more likely to be found among those who are familiar with the dynamics of the psyche rather than those who are not (Maslow, 1965; Vaillant, 1977). As Schott (1991) has written, the better we know ourselves, the better our chances of understanding others.

In the 1970s and 1980s, educational leadership scholars and practitioners significantly shifted their primary general focus of interest. Whereas previous perspectives were heavily grounded in the social and behavioral sciences, in the 1990s, inquiry into (a) the knowledge base, and (b) the preparation of educational leaders applied cognition theory and problem-based pedagogies that drew heavily on cognitive psychology and behavioral psychology. Insights into education leadership were sought through a greater understanding of the way leaders think, what they think about, and how they tie their thinking to their actions. Cognitive psychologists indicate that expert leaders develop their expertise by (a) acquiring declarative knowledge, (b) compiling that knowledge into schemata (abstract structures built on connections between elements of knowledge), and (c) associating behavior routines with those schemata (Ohde & Murphy, 1993, p. 78).

EXPANDING THE KNOWLEDGE BASE OF LEADERSHIP

A second contribution of this study to theory concerns the knowledge base of leaders. It has helped to identify the types of knowledge that leaders need to deal with organizational problems in a more expert and effective way. Such knowledge is especially useful for current and prospective school leaders in dealing effectively with the demands of their jobs. A key feature of this study is its identification of the importance of exposure to some of the issues and problems of one's particular field. Such experiences provide an individual with exposure to multiple patterns of organization that are stored in memory for further reference. It is this kind of knowledge that enables an individual to develop argumentation in support of an action plan. Further research is needed to identify additional types of problem-related knowledge.

In addition, as with expertise in other fields or disciplines, the question of how problem-solving expertise develops is important. There is no doubt that experience enhances knowledge structure. Yet, it cannot account fully for the development of expertise. I suggest that research focused particularly on the *stages* through which leaders go in the process of acquiring expertise is of importance. Evidence from such studies could provide administrators—whether they are aspirants or practitioners with a range of experience—with models of expert problem solving that are congruent with their career stages.

Finally, the ability to solve ill-defined organizational problems is not enough. Leaders must be able to formulate solutions that will work in complex organizational environments and suit multiple stakeholders and long term-organizational visions (Conger & Kanungo, 1988; Tusi, 1984). Under these conditions, the development of judgement seems to be of outmost importance. Further research on the role of judgement in problem solving and decision-making, as well as how it develops in leaders, is required.

IMPLICATIONS FOR PRACTICE

CONTRIBUTING TO THE DEVELOPMENT OF LEADERSHIP

From a practitioner's point of view, the importance of including cognitive approaches as a component of leaders' preparation programs warrants more attention. Bandura (1986), for example, has noted the need for systematic training in the use of cognitive skills. In the area of problem solving, he found that the development of cognitive skills requires much more than a simple sequential execution of cognitive operations. Consequently, people who are left to develop personal methods and schemas for acquiring cognitive skills will engage in trial-and-error attempts. Such skills are better learned in systematic professional development that includes instruction, modelling, practice, and feedback.

The importance of schemata, particularly their role in interpreting and organizing new information, has been identified in the literature as an important factor in effective behaviour. Leaders should be exposed systematically to experiences that have been designed to enhance the development of effective schemata and their application in administrative performance. Problem-solving skills may be an appropriate focus for such leader training programs. Prospective leaders should be exposed to organizational problems and taught processes and strategies to solve them effectively. If pattern recognition is important for expertise in other fields—such as medicine and physics—it should also be important in expertise for educational leaders.

INSTRUCTION

From the instructional point of view, the cognitive skills that leaders should acquire are:

- considering all potential sources of information when facing a problem,
- comparing new information to what is known or inferred,
- sifting through information to separate the relevant from the irrelevant,
- identifying gaps in information and possible means for filling in those gaps,
- considering the possible causal relationship between observed behaviour, inferred information, and other factors,
- formulating hypotheses to tentatively explain the relationship among those factors,
- formulating questions to test and evaluate these hypotheses,
- assessing the nature of tasks that need to be performed,
- formulating specific goals, and
- evaluating the results of actions taken and taking this information into account in subsequent planning.

ASSESSMENT AND TRAINING OF LEADERS

Studies of leader assessment have traditionally focused on various skills that are assumed to underlie leadership performance. With the exception of abilities, motives, and personality characteristics, these assessments have tended to focus on observable performance, and little attention has been given to knowledge structures and mental processes. The present study underscores the importance of these capabilities in the exercise of effective leadership. Accordingly, training programs ought to be devised that use case studies, problem-based instruction, and other instructional techniques that encourage leaders to entertain alternative definitions of a problem situation or to articulate multiple potential consequences of an event.

CONCLUSIONS

In undertaking this study, my intention was to investigate how the use of cognitive approaches may help generate more complete and comprehensive theories of leadership. Through this lens, I thought, we would be able to describe and understand more thoroughly the nature and practice of educational administration. This line of thinking was fuelled by such writers as Evers and Lakomski (1994), who justified as follows the appropriateness of cognitive theories as a basis for explaining, in a naturalistic manner, how people learn or acquire knowledge:

> *All epistemologies need to cohere with accounts of how humans learn, or acquire knowledge. Since we think that the best theories of learning come from natural science accounts of human processing in the brain, rather than the a priori, or common sense, accounts more typical of philosophical invention, our coherentism coheres with natural science. (p. 6)*

Evers (1996) completed the argument for linking cognitive approaches and administrative practice by highlighting the importance of inclusivity in administrative theory. He suggested that the most useful theories are those that link with other theories to form a comprehensive knowledge base. Germane to the present study, the quality of theoretical inclusivity demands that administrative theory incorporate linkages between cognitive theories and practices.

Until recently, leadership theories have focused on how leaders exercise interpersonal influence behaviourally. This line of research has a long history beginning with the seminal studies of Fleishman (1953) on consideration and initiating structure and proceeding to more recent theories such as the individualized leadership theory of Dansereau et al. (1998). The cognitive approach does not discount the value of the previous theories. In fact, it extends them by identifying some of the specific internal mechanisms that are needed to engage in these behaviours. At the same time, this approach adds a significant element to our conceptions of leadership. It postulates that leadership may sometimes be a rather indirect phenomenon where influence is exercised through *thinking* and *feeling*—about ourselves, about our jobs, and about the nature of the educational process.

As with any new theoretical thrust, this study does not answer all the questions that can bridge the gap between cognitive theories and administrative practices. However, I believe that it has added to existing understandings by showing that such a link is possible and fruitful in the study of educational administration.

REFERENCES

Allison, D. J. (1996a). Problem finding, classification, and interpretation: In search of a theory of administrative problem processing. In K. Leithwood, D. Corso, P. Hallinger, & A. Hart (Eds.), *International handbook of educational leadership and administration*. Luwer Academic.

Allison, D. J. (1996b). *Problem processing and the principalship: Theoretical foundations and the expertise issue*. ERIC Document Reproduction No. 412 602

Allison, D. J., & Allison, P. A. (1993). Both ends of a telescope: Experience and expertise in administrative problem solving. *Educational Administrative Quarterly, 29*, 302-321.

Allix, N. M. (2000). Transformational leadership: Democratic or despotic? *Educational Management & Administration, 28*(1), 7-20.

Bainbridge, L. (1990). Verbal protocol analysis. In J. R. Wilson & E. N. Corlett (Eds.) *Evaluation of human work: A practical ergonomics methodology* (pp. 161-199). London: Taylor & Francis.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.

Barnett, K., McCormick, J., & Conners, R. (2001). Transformational leadership in schools-Panacea, placebo or problem? *Journal of Educational Administration, 39*(1), 1-23.

Bass, B. M. (1985). *Leadership and performance beyond expectations*. New York: Free Press.

Bass, B. M. (1990). *Bass and Stogdill's handbook of leadership*. New York: Free Press.

Bass, B. M., & Avolio, B. J. (1993). Transformational leadership: A response to critics. In R. Ayman (Ed.), *Leadership theory and research: perspectives and directions*. San Diego: Academic Press.

Bass, B. M., & Avolio, B. J. (1997). *Multifactor Leadership Questionnaire*. Redwood City, CA: Mind Garden.

Begley, P. T. (1996). Cognitive perspectives on values in administration: A quest for coherence and relevance. *Educational Administration Quarterly, 32*(3), 403-426.

Bessai, F. (1995). Review of the Multifactor Leadership Questionnaire. In J. C. Conoley & J. C. Impara (Eds.), *The twelfth mental measurements yearbook* (pp. 650-651). Lincoln, NE: The University of Nebraska-Lincoln, The Buros Institute of Mental Measurements.

Boas, S. (1999). An evaluation of conceptual weaknesses in transformational and charismatic leadership theories. *Leadership Quarterly, 10*(2), 285-301.

Brack, C. J., & Brack, G. (1995). How chaos and complexity theory can help counselors to be more effective. *Counseling and Values, 39*(3), 200-209.

Campbell, R., Fleming, T., Bennion, J., & Newell, J. T. (1987). *A history of thought and practice in educational administration.* New York: Teachers College Press.

Chase, W. G., & Chi, M. T. H. (1980). Cognitive skill: Implications for spatial skill in large-scale environments. In J. Harvey (Ed.), *Cognition, social behavior, and the environment*. Potomac, MD: Erlbaum.

Chi, M. T. H., Feltovich, P. J., & Glaser, R. (1981). Categorization and representation of physics problems by experts and novices. *Cognitive Science, 5*, 121-152.

Chi, M. T. H., Glaser, R., & Rees, E. (1982). Expertise in problem solving. In R. Sternberg (Ed.), *Advances in the psychology of human intelligence*. Hillsdale, NJ: Erlbaum.

Christie, P. (1998). Schools as (dis)organizations: The breakdown of the culture of learning and teaching in South African schools. *Cambridge Journal of Education, 28*(3), 283-300.

Conger, J. A. (1999). Charismatic and transformational leadership in organizations: An insider's perspective on these developing streams of research. *Leadership Quarterly, 10*(2), 145-170.

Conger, J. A., & Kanungo, R. N. (1988). *Charismatic leadership: The elusive factor in organizational effectiveness*. San Francisco: Jossey-Bass.

Connelly, M. S., Gilbert, J. A., Zaccaro, S. J., Threlfall, K. V., Marks, M. A., & Mumford, M. D. (2000). Exploring the relationship of leader skills and knowledge to leader performance. *Leadership Quarterly, 11*(1), 65-86.

Cowan, D. A. (1988). Executive's knowledge of organizational types: Applying a contingency perspective. *Journal of Management, 14*(4), 513-527.

Cowan, D. A. (1991). The effect of decision-making styles and contextual experience on executives' descriptions of organizational problem formulation. *Academy of Management Journal, 33*, 366-380.

Cuban, L. (1993). Forewarn. In K. L. P. Hallinger & J. Murphy (Eds.) *Cognitive perspectives on educational leadership*. New York: Teachers College Press.

Culbert, S., & McDonough, J. (1985). *Radical management*. New York: Free Press.

Dansereau, F., Yammarino, F. J., Markham, S. E., Alutto, J. A., Newman, J., & Davis, S. H. (1998). Superintendents' perspectives on the involuntary departure of public school principals: The most frequent reasons why principals lose their jobs. *Educational Administration Quarterly, 34*, 58-90.

Day, C., Harris, A., & Hadfield, M. (2001). Challenging the orthodoxy of effective school leadership. *Leadership in Education, 4*(1), 39-56.

Deal, T. E., & Peterson, K. D. (1994). *The leadership paradox: Balancing logic and artistry in schools.* San Francisco: Jossey-Bass.

Den Hartog, D. N. (1997). Transactional versus transformational leadership: An analysis of the MLQ. *Journal of Occupational and Organizational Psychology, 70*, 19-34.

Denzin, N. K., & Lincoln, Y. S. (2000). *Handbook of qualitative research.* Thousand Oaks: CA: Sage.

Dose, J. J. (1997). Work values: An integrative framework and illustrative application to organizational socialization. *Journal of Occupational & Organizational Psychology, 70*(3), 27-54.

Ericsson, K. A., & Charness, N. (1994). Expert performance: Its structure and acquisition. *American Psychologist, 49*, 725-747.

Ericsson, K. A., & Simon, H. A. (1993). *Protocol analysis: Verbal reports as data.* Cambridge: MIT Press.

Evers, C. W., & Lakomski, G. (1996). Science in educational administration: A postpositivist conception. *Educational Administration Quarterly, 32*(3), 344-365.

Fleishman, E. A. (1953). Leadership climate, human relations training, and supervisory behavior. *Personnel Psychology, 6*, 205-222.

Frederiksen, N. (1984). Implications of cognitive theory for instruction in problem solving. *Review of Educational Research, 54*(3), 363-407.

Funke, J. (1991). Solving complex problems: Exploration and control of complex systems. In R. Sternberg & P. Frensch (Eds.), *Complex problem solving- principles and mechanisms*. Hillsdale: NJ: Erlbaum.

Gardner, H. (1987). *The mind's new science: The history of the cognitive revolution*. New York: Basic Books.

Glaser, R., & Chi, M. T. H. (1988). Overview. In M. T. H. Chi, R. Glaser, & M. Farr (Eds.), *The nature of expertise*. Hillsdale, NJ: Lawrence Earlbaum.

Green, R. L. (2001). *Practicing the art of leadership: A problem-based approach to implementing the ISLLC standards*. Upper River, NJ: Prentice-Hall.

Gronn, P. (1996). From transactions to transformations: A new world order in the study of leadership. *Educational Management and Administration, 24*(1), 7-30.

Haller, E., & Strike, K. A. (1986). *An introduction to educational administration: Social, legal, and ethical perspectives.* New York: Longman.

Hallinger, P., Leithwood, K., & Murphy, J. (1993). *Cognitive perspectives on educational leadership.* New York: Teachers College Press.

Hanson, E. M. (1996). *Educational administration and organizational behavior.* Boston: Allyn & Bacon.

Hart, A. W. (1999). Educational leadership: A field of inquiry and practice. *Educational Management and Administration, 27*(3), 323-334.

Hemphill, J. K. (1949). *Situational factors in leadership.* Columbus: Ohio State University Personnel Research Board.

Hodgkinson, C. (1991). *Towards a philosophy of administration.* Oxford: Basil Blackwell.

Hoy, W. K., & Miskel, C. G. (1996). *Educational administration: Theory, research, and practice.* New York: McGraw Hill.

Hudson, C. G. (2000). At the edge of chaos: A new paradigm for social work? *Journal of Social Work Education*, 36(2), 215-231.

Isenberg, D. J. (1986). Thinking and managing: A verbal protocol analysis of managerial problem solving. *Academy of Management Journal, 4*, 775-788.

Kail, R. V., & Bisanz, J. (1982). Cognitive strategies. In R. V. Kail & J. Bisanz (Eds.) *Handbook of research methods in human memory and cognition.* Hillsdale: NJ, Lawrence Erlbaum Associates.

Kilmann, R. (1989). *Managing beyond the quick fix.* San Francisco: Jossey-Bass.

Kirnan, J. P. (1995). Review of the Multifactor Leadership Questionnaire. In J. C. Conoley & J. C. Impara (Eds.), *12th mental measurements yearbook* (pp. 651-654). Lincoln, NE: University of Nebraska Press.

Kluckhohn, F. R., & Strodtbeck, F. L. (1961). *Variations in value orientations.* Evanston, IL: Row, Peterson.

Leithwood, K. (1992). The move toward transformational leadership. *Educational Leadership, 4*, 221 244.

Leithwood, K. (1995). Cognitive perspectives on school leadership. *Journal of School Leadership, 5*, 115-135.

Leithwood, K. A., Jantzi, D., & Steinbach, R. (1999). *Changing leadership for changing times.* Buckingham, Philadelphia: Open University Press.

Leithwood, K., & Jantzi, D. (1989). Expertise in principals' problem solving. *Educational Administration Quarterly, 25*, 121-161.

Leithwood, K., & Jantzi, D. (1990). *Transformational leadership: How principals can help reform school culture.* ERIC Document Reproduction No. 323 622

Leithwood, K., & Steinbach, R. (1991). Indicators of transformation leadership in the everyday problem solving or school administrators. *Journal of Personnel Evaluation in Education, 4*, 221-244.

Leithwood, K., & Steinbach, R. (1995). *Expert problem solving: Evidence from school and district leaders.* New York: New York University Press.

Leithwood, K., Steinbach, R., & Raun, T. (1993). Superintendents' group problem-solving processes. *Educational Administration Quarterly, 29*(3), 364-391.

Lesgold, A., & Glaser, R. (1989). *Foundations for a psychology of education.* Hillsdale, NJ: Earlbaum.

Lowe, K. B., Kroeck, K. G., & Sivasubramaniam, N. (1996). Effectiveness correlates of transformational and transactional leadership: A meta-analytic review of the MLQ literature. *Leadership Quarterly, 7*, 385-425.

Lyles, M. (1987). Defining strategic problems: Subjective criteria of executives. *Organization Studies, 8*, 263-269.

Marshall-Mies, J. C., Martin, J. A., Fleishman, E. A., Zaccaro, S. J., Baughman, W. A., & McGee, M. L. (1996). *Development and evaluation of cognitive and metacognitive measures for predicting leadership potential.* Bethesda, MD: Management Research Institute.

Maslow, A. (1965). Eupsychian management. Homewood, IL: Dorsey Press.

McCall, M. W., & Kaplan, R. E. (1985). *Whatever it takes: Decision makers at work.* Englewood Cliffs, NJ: Prentice-Hall.

Mintzberg, H. (1973). *The nature of managerial work.* New York: Harper & Row.

Mintzberg, H., Raisinghani, D., & Theoret, A. (1976). The structure of 'unstructured' decision processes. *Administrative Science Quarterly, 21*, 246-275.

Mumford, M. D., & Connelly, M. S. (1991). Leaders as creators: Leader performance and problem solving in ill-defined domains. *Leadership Quarterly,* 2, 289-316.

Mumford, M. D., Gessner, T. L., Connelly, M. S., O'Connor, J. A., & Clifton, T. (1993). Leadership and destructive acts: Individual and situational influences. *Leadership Quarterly, 4*, 115-147.

Mumford, M. D., Zaccaro, S. J., Harding, F. D., Jacobs, T. O., & Fleishman, E. A. (2000). Leadership skills for a changing world: Solving complex social problems. *Leadership Quarterly, 11*(1), 11-35.

Newell, A., Rosenblum, P., & Laird, J. (1990). Symbolic architectures for cognition. In M. Posner (Ed.), *Foundations of cognitive science* Cambridge: MIT Press.

Nickerson, R. S. (1988-1989). On improving thinking. In E. Z. Rotherkopf (Ed.) *Review of research in education*. Washington, DC: American Educational Research Association.

O'Connor, J., Mumford, M. D., Clifton, T. C., Gessner, T. E., & Connelly, M. S. (1995). Charismatic leaders and destructiveness: A historiometric study. *Leadership Quarterly, 6*(4), 529-555.

Ohde, K. L., & Murphy, J. (1993). The development of expertise: Implications for school administrators. In K. L. P. Hallinger & J. Murphy (Eds.) *Cognitive perspectives on educational leadership*. New York: Teachers College Press.

Oxford English Dictionary Online. (2002). Oxford, UK: Oxford University Press.

Pawar, B. S., & Eastman, K. K. (1997). The nature and implications of contextual influences on transformational leadership: A conceptual examination. *Academy of Management Review, 22*, 80-109.

Podsakoff, P. M., MacKenzie, S. B., & Bommer, W. H. (1996). Transformational leader behaviors and substitutes for leadership as determinants of employee satisfaction, commitment, trust, and organizational citizenship behaviors. *Journal of Management, 22*, 259-298.

Podsakoff, P. M., MacKenzie, S. B., Moorman, R. H., & Fetter, R. (1990). Transformational leader behaviors and their effects on follower's trust in leader, satisfaction, and organizational citizenship behaviors. *Leadership Quarterly, 1*, 107-142.

Pressley, M., & Afflerbach, P. (1995). *Verbal protocols of reading: The nature of constructively responsive reading*. Hillsdale: NJ: Erlbaum.

Puddifoot, J. E. (2000). Some problems and possibilities in the study of dynamical social processes. *Journal of the Theory of Social Behavior, 30*(1), 79-98.

Reimann, P., & Chi, M. T. H. (1989). Human expertise. In J. Gilhooly (Ed.), *Human and machine problem solving*. New York: Plenum Press.

Rummelhart, D. (1980). Schemata: The building blocks of cognition. In R. Spiro (Ed.), *Theoretical issues in reading comprehension* (pp. 27-42). Hillsdale, NJ: Laurence Erlbaum.

Schmidt, F. L., & Hunter, J. E. (1992). Development of a casual model of processes determining job performance. *Current directions in psychological science, 1*,(3), 89-92.

Schott, R. L. (2001) Administrative and organizational behavior. Some insights from cognitive psychology. *Administration and Society, 23*(1), 54-73.

Sergiovanni, T. J. (1992) *Moral leadership: Getting to the heart of school improvement.* San Francisco: Jossey-Bass.

Sergiovanni, T. J. (1994). The roots of school leadership. *Principal, 74*(2), 6-9.

Sergiovanni, T. J. (1991*). Value-added leadership: How to get extraordinary performance in schools.* New York: Harcourt Brace Jovanovich.

Shamir, B. (1999). An evaluation of conceptual weaknesses in transformational and charismatic leadership theories. *Leadership Quarterly, 10*(2), 285-306.

Sternberg, R. J., & Wagner, R. K. (1993). The g-ocentric view of intelligence and job performance is wrong. *Current Directions in Psychological Science, 2*, 1-5.

Taylor, F. W. (1947). *Scientific management.* New York: Harper & Row.

Taylor, K. L., & Dionne, J. P. (2000). Assessing problem-solving strategy knowledge: The complementary use of concurrent verbal protocols and retrospective debriefing. *Journal of Educational Psychology, 92*(3), 413-425.

Ubben, G. C., Hughes, L. W., & Norris, C. J. (2001). *The principal: Creative leadership for effective schools.* Boston: Allyn & Bacon.

Vaillant, G. (1977). *Adaptation to life*. Boston: Little, Brown.

Van Lehn, K. (1989). Problem solving and cognitive skill acquisition. In M. I. Posner (Ed.), *Foundations of cognitive science*. Cambridge, MA: MIT Press.

Van Lehn, K. (1990). Problem solving and cognitive skill acquisition. In M. I. Posner (Ed.), *Foundations of cognitive science*. Cambridge: MIT Press.

Van Someren, M. W., Barnard, Y. F., & Sandberg, J. A. (1994*). The think-aloud method: A practical guide to modeling cognitive processes.* London: Academic Press.

Voss, J. F., Greene, T. R., Post, T. A., & Penner, B. C. (1983). Problem-solving skill in the social sciences. *The Psychology of learning and motivation: Advances in research and theory, 17,* 165-211.

Wagner, R. K. (1991). Managerial problem solving. In R. J. Sternberg & P. Frensch (Eds.), *Complex problem solving: principles and mechanisms*. Hillsdale, NJ: Erlbaum.

Wagner, R. K., & Sternberg, R. J. (1985). Practical intelligence in real-world pursuits: The role of tacit knowledge. *Journal of Personality and Social Psychology, 48,* 436-458.

Wheatley, M. J. (1999). *Leadership and the new science*. San Francisco: Berrett-Koehler.

Yukl, G. A. (1994). *Leadership in organizations*. Englewood Cliffs, NJ: Prentice-Hall.

Yukl, G. A. (1997). *Effective leadership: A new taxonomy and model*. Paper presented at the Eastern Academy of Management International Conference, Dublin, Ireland.

Zaccaro, S. J., Gilbert, J. A., Thor, K. K., & Mumford, M. D. (1991). Leadership and social intelligence: Linking social perceptiveness to behavioral flexibility. *Leadership Quarterly,* 2, 317-347.

Zaccaro, S. J., Mumford, M. D., Connelly, M. S., Marks, M. A., & Gilbert, J. A. (2000). Assessment of leader problem-solving capabilities. *Leadership Quarterly, 11*(1), 37-65.

APPENDICES

APPENDIX A

PRINCIPALS' PROFILES

James

James is the principal of a medium size urban elementary school that draws its population from the surrounding upper-middle class area. James has been a principal to the school for five years and he doesn't hesitate to state that his school is well respected in the community and that parents and students are happy about the things that go on in the school. To maintain that respect, James believes that it's important to establish good public relations with all stakeholders. Being the only male among female teachers, James emphasized the nurturing role of teaching and he stated, *"because of this caring sort of atmosphere, we don't run into much of power struggles."*

Karen

Karen is the principal of a medium size suburban elementary-junior high school located in a small town in Western Canada. Its student population comes from the town and the surrounding area. The school accommodates students from kindergarten to grade 12 in a variety of courses taught by 20 teachers. At the time of the interview, Karen was a new principal to the school, and also new to the principalship with only 2 years of administrative experience. For Karen the most important aspect of her job was to be supportive and encouraging to her staff. As a principal, Karen believed that she needed to be an advocate for her staff, working with them closely to make them successful. As with Marina, Karen prefers to look at problems as learning opportunities both for herself and her staff. Karen also believes that she has to be open and always willing to listen to people's concerns.

Sharon

Sharon is the principal of a medium size elementary school located in a suburban town in Western Canada. Being new to the principalship, Sharon is assisted in her administrative duties by her Vice-Principal, whom she includes in the decision-making process often. Sharon believes that having a Vice-Principal helps her by "giving her two sets of ears" and at the same time, that provides him with valuable administrative experience to use when he becomes principal. Sharon believes that as a principal she must allow her staff to bring forward ideas and initiate changes in the school. Her role is to listen and learn from her staff, and support them so that they succeed in their teaching role. Sharon prefers to work on little problems to prevent them from becoming bigger, but she also admits that she likes to look at problems as opportunities for learning.

Gerry

Gerry is the principal of a large elementary/junior high school located at the outskirts of a metropolitan city. Gerry had been newly appointed to the principalship after having served fourteen years as a Vice-Principal in the same school. Gerry believes that as a principal he needs to supervise teachers regularly by walking in the classrooms and talking to them. Gerry perceives education *"as a very people oriented business,"* and regardless of what level one is, *you're still doing the same thing, solving the same problems."* Although Gerry believed that people should be included in decision-making by sharing information, he was particular straight to state that everyone should "*obey the rules and abide by them.*" Gerry sees the principalship primarily as political where everyone should be *"above board"* and *"treat each other with due respect and fairness."*

Wendy

Wendy is the principal of a large elementary community school located in an urban city in Western Canada. The school draws its population from the surrounding upper-class neighbourhood. Wendy has been a principal to the school for the last four years, and she had had another 10 years of administrative experience at the Central Office. As a leader, Wendy believes that her work is to empower people and to nurture within each person a sense of commitment, responsibility, and passion. She sees her role as one to make people successful, and she communicates that role to her staff. Wendy also believes that self-reflection helps her grow to become a better leader and a better person and she doesn't hesitate to ask her staff to reflect on their practices too. For Wendy it is also important to know every child in the school. In her own words *"I feel awful when I don't know every child in the school and to know them personally, not just knowing their name.* Wendy's vision for leadership is to help everyone be successful.

Marina

Marina is the principal of a medium size urban school located in a metropolitan city in Western Canada. Its students range from Kindergarten to grade 6 and its staff both teaching and support sum up to 30. Marina is a young woman in her late thirties and she has been a principal for less than 4 years. Marina's interest in entering administration was motivated by her desire to help create a positive learning environment for the students. A strong supporter of active learning, Marina, described herself as an instructional leader. She believed that the most important part of her job as a principal was to address the emotional aspect of teachers, to listen to their concerns, and to consider everyone's suggestions when making decisions. For Marina it was important that the lines of communication with all stakeholders remain always open, and although she perceived problems as part of her life as a principal, she chose to *"look at them as gifts"* something that can be *"a positive experience"* for all.

Keith

Keith is the principal of a medium size suburban high school. Keith was new to the job at the time of the interview and he had also served as a Vice-Principal at the same school for two years before his present position. Keith said that his first year as the principal of the school was a tough one, since he was working very closely with the previous principal. Keith said that he knows the school, and he also feels very confident that he "*can handle any crisis, no matter how difficult it may be*." Keith likes to think of himself primarily as a teacher, rather than an administrator, thus teachers' issues are always at the forefront for him.

Norm

Norm is the principal of a medium size urban elementary school. Norm has been a principal for the last 6 years but he was new to that school. Norm sees his role as a servant rather than an administrator. For Norm there has to be a balance between the decisions that he has to make and those that come from the people after sharing with them all the necessary information. His philosophy is to "*let people know your parameters*" so that whatever decision is made by the end of the day, "*you can live with it*." Norm also believes that he should be a role model to his teachers, leading the way. He also believes that enthusiasm should be a part of his job that eventually is transmitted to other people around him.

Christine

Christine is the principal of a medium size urban elementary school located in a metropolitan city in Western Canada. The school population ranges from Kindergarten to grade 6. Christine has been a principal to the school for 2.5 years. Before being a principal, Christine was a special education teacher and because of that background she believes that a good teacher should be able to teacher effectively every grade level, regardless of extra qualifications. For Christine, the most important value as an educator is professionalism. Teachers and the principal should be able to perform their duties in a professional manner having as the centre of their focus the students' learning.

Paul

Paul has been the principal of a large size elementary school located in a metropolitan city in Western Canada. Paul had been a principal for 21 years and close to retirement at the time of the interview. Paul brings a rich administrative experience from all the years that he has served as a principal and his philosophy was to help students *"go as far as they can as individuals."* Based on that philosophy, Paul sees his role as helping teachers *"develop understanding and acceptance."* Paul likes to be working with supportive people and his main focus when working with teachers is to make sure that they have enough resources to do their job and that they are treated with respect and dignity.

APPENDIX B

CASES

TRAINING CASE

Instructions

You are about to be handed a problem that you will be asked to solve. From the time you will be handed the problem you will be asked to think aloud while working on it, stating any thought that comes to your mind pertinent to the problem.

Case

You are the principal of Aberhart Junior High School and you know that the school has a deficit of $70,000 and student enrollment is down. You also know that staff members are worried about department cuts. You have the responsibility, as a principal, to decrease the deficit and increase student enrolment. How would you go about solving that problem?

HUMAN RELATIONS CASES

CASE 1: SPECIAL NEEDS STUDENTS

You are the principal of Aberhart School with a considerable number of special needs students. It has been a district policy that when special students are integrated into regular classrooms a TA should be provided. Due to increased student enrolment the number of TA's has been increased significantly during the last decade. Emily has been a TA for the past eight years with an excellent record of service. At the same time that she was serving as a TA, she enrolled in a special TA-BEd program and graduated just a year ago. She has, however, decided to remain as a TA until a teaching position appears. Tension started to occur between Emily and a social science teacher when one day that a social science exam was given, she was sitting in class providing assistance to those students who needed, regardless the teacher's request that she should not assist students in writing the exam. Emily refused to comply with this request arguing that her role was to help students whenever they needed help. After all, she was a teacher now and he had no right to tell her what to do. The tension escalated to such degree that it took the intervention of the neighbouring teachers to prevent the argument from becoming more serious. Emily and the social science teacher have asked for a meeting with you to discuss the situation. How would you go about solving this problem?

CASE 4: WHAT TO DO ABOUT VERONICA

Veronica is a speech teacher at Aberhart School for 30 years. Due to funding cuts the speech department was forced to be eliminated and the school board has decided to contract speech services with an outside agency. Being the principal of Aberhart you received a letter from the superintendent asking you to place Veronica in an eight grade class with high needs students as a special education teacher. Veronica is furious with the superintendent's decision and she thinks that he and the board are trying to get rid of her. Veronica had suffered back problems and had been on half time sick leave last year. At that time, the Board applied for Long Term Disability on her behalf, but the claim was denied. Veronica is outraged at the way she has been treated. She has never taught intermediate students and knows that there is no way she can cope with a grade eight class.

To make matters worse, Veronica's past performance evaluations all indicated that she had been doing a "satisfactory job", although she had an unofficial reputation of being an incompetent teacher and a very unusual woman. The grade eight class she has been assigned to is considered one of the "toughest" class of the school. Veronica also enjoys the support of other teachers at the school who are outraged and think that the superintendent has been completely unfair to her. They come to you to express their concerns and although they realize that Veronica is not the world's greatest teacher they feel that she is being treated terribly. They also request that you should look into this matter personally and come up with an optimal solution. How would you go about solving this problem?

CASE 5: DISCIPLINE PROBLEMS

Aberhart School experienced a bitter, destructive teacher strike in the early 90's. Immediately after the strike the principal of Aberhart retired and you are appointed as a new principal. Everyone sees you as a "change agent" to provide the so much needed instructional leadership at Aberhart into the new millennium. Although it took you a while to put change into place, the endeavour of empowering the staff to make changes was making slow but steady progress under your leadership. The first year of your principalship was uneventful except for some parent complaints about student discipline. Parents perceived that the discipline that was exercised at Aberhart was harsh, rigid, and punitive rather than problem solving and preventative. The superintendent has discussed these concerns with you, who immediately set about to remedy the ill feelings and try to change some perceptions.

It wasn't long, however, before problems escalated rather dramatically when a grade-nine student was suspended for using abusive language against a teacher during a class in the presence of other students. It was the third such incident for the student, but unfortunately the suspension coincided with the grade nine-graduation ceremony. The parents of the student appealed the decision to the superintendent. The superintendent asks you to let the student to participate in the ceremony and still fulfill the suspension. Sensing that this will create a lot of discomfort among staff you have decided not to compromise. How would you go about solving this problem?

STRATEGIC CASES

CASE 2: INTRODUCING CHANGE

You are the principal of Aberhart School and you have decided to change the school's philosophy and focus entirely. The school is to follow the doctrines of the "inclusive schooling mode" effective immediately. A staff meeting is being called at the beginning of the school year where you inform the staff about the coming change. Teachers express the concern that without consultation, in service preparation, and instruction on what "inclusive schooling" is, they would encounter many difficulties on how to approach it. You, however, reassure them that a school reform specialist has been invited to the school and regular staff meetings will take place for the staff to share concerns and questions regarding this direction. A couple of months later, however, you received a teacher's resignation followed by a letter stating that the unclear and disorganized nature of inclusive schooling model that was introduced had taken too much of a toll. Randy, the vice- principal also informs you of other teachers' dissatisfaction with the proposed change, and that they are going to express their concern to the superintendent if you don't take action immediately. How would you go about solving this problem?

CASE 3: BUDGET CONSTRAINTS

Student enrolment has been on decline in Aberhart School for the past ten years. You are a new principal to that school and you are informed of a new policy of in service education for your staff on the bases of site-based management. You are also entitled to a campaign of staff empowerment through a restructuring of the decision-making process allowing for more staff input into decisions at the school level. Due to budget constraints and low enrolment you are obliged to go about split classes for the coming year. Problems, however, don't take long to appear. Teachers are coming to your office complaining that they experience extreme stress by teaching split classes and they ask if they could get additional help by hiring more teachers. You know, however, that due to low student enrolment, class-sizes are small in comparison to the average in your district and hence, teachers should not complain and demand to hire new staff to help them. The problem has also affected the students of the school and a group of parents is asking for an immediate meeting with you. How would you go about solving this problem?